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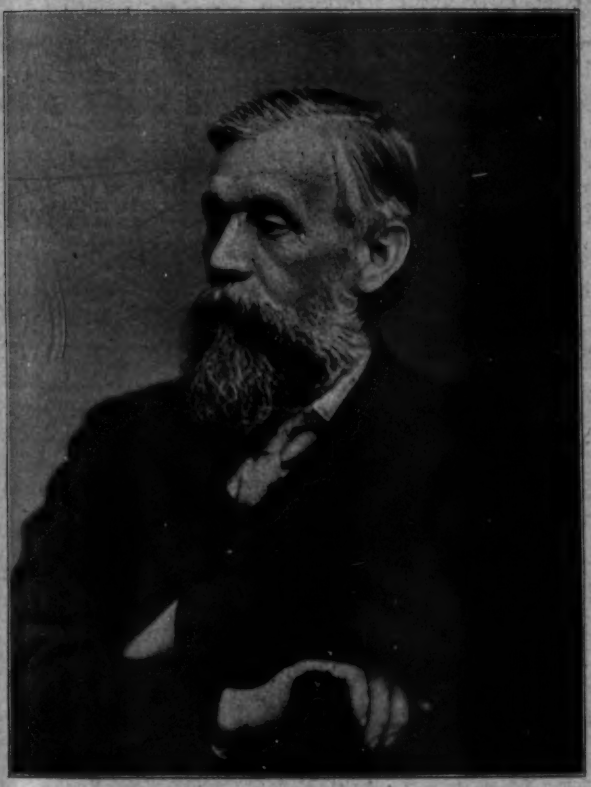

THE LATE SIR MICHAEL FOSTER.

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A MONTHLY MAGAZINE AND REVIEW FOR THE SCHOOL-ROOM AND THE STUDY

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ABOUT OURSELVES.

IN the present issue the Editor presents to his readers a varied assortment of what he hopes may prove interesting and useful matter.

The paper by Mr. Philip Gibbs embodies an outside opinion on a subject of real interest to every teacher, both as a student and as an educator. The writer is a well-known journalist, who looks at his subject from the point of view which cannot readily be attained by the professional worker. It is good that we should occasionally look with the public eye upon the work of the schools, and endeavour to gather useful hints from those who do not belong to the great teaching army. As teachers we are a little apt to take a point of view which is too bookish. Even in dealing with books this is a mistake. Mr. Gibbs's point of view is rather that of John Morley in his essay on Aphorisms, where he writes:—"It has been said that the order of our knowledge is this: that we know best, first, what we have divined by native instinct; second, what we have learned by experience of men and things; third, what we have learned not in books, but by books—that is, by the reflections that they suggest; fourth, last and lowest, what we have learned in books or with masters."

It is our intention to set apart a considerable amount of space in each number of *The Practical Teacher* in order to afford what help we can to the teacher of infants. Mr. Maskell Hardy in the present issue deals lucidly with the important matter of the training of the infant voice. Next month we hope to publish a paper by Miss Catherine I. Dodd on "The Beginnings of Literature," which will also be of special interest to the teacher of the little ones, whose work is perhaps the most onerous in the teaching profession.

Teachers of geography will find in Dr. Knight's paper practical help in an important part of their work, and, by means of Mr. Wethey's interesting topical notes, will be able to keep their instruction in this subject well up-to-date. Next month we hope to offer an interesting paper for history teachers on the subject of general history in the primary grades.

Our English competition has not brought in a large number of solutions to the conundrum—"How shall we teach reading so as to make the instruction a preparation for the reading of real literature?"—but the papers which we have received contain much that is interesting and suggestive. After careful consideration, the Editor has decided to award the prize of one guinea to Miss Cunnington, of 10 Montpelier Crescent, Brighton, whose paper he hopes to print next month. He also wishes to thank very cordially the following contributors for their papers: Mr. W. Ouseley Barton, Boys' Council School, Newport (I.W.); Experience; Miss Evelyn Bell, Troutbeck, Windermere; Meithrinva; and Miss Ida B. Waterson, Sheffield.

A new feature commenced in this month's issue is entitled "The Book-Lover," and is intended to offer hints for the teacher's general reading. We also commence our column "Educational Experiment" in this number, as promised last month; but we have been obliged, for lack of space, to hold over the paper on "Oxford Educators" which we announced in our February issue.

The Editor wishes to tender his cordial thanks to those who have been kind enough to give expression by letter to their approval of his attempts to make *The Practical Teacher* of real utility in the work of education.

May he venture to ask those of his readers who find the paper interesting and useful to make it known to other possible subscribers. There is no reason why *The Practical Teacher* should not be found helpful in schools of all grades. Its aim is to provide material for use in the kindergarten, the infants' school, the preparatory school, the public elementary school, the secondary school, and the pupil teachers' centre. Social barriers have little or nothing to do with real educational effort. In other words, there is no royal road to learning.

EDUCATIONAL OPINION

GENERAL NOTES.

AS all our readers know quite well, Dr. Macnamara (the *Mr.* Macnamara of the *Daily Telegraph*) has been appointed Parliamentary Secretary to the Local Government Board. This is an application of the principle that when a man has made himself master of a certain subject he may safely be assumed to have had an excellent preparation for studying something else. We do not mean to insinuate that Dr. Macnamara knows little or nothing about local government. We merely wish to emphasise the fact that he knows something about education, and that there are few educational administrators of whom the same can truthfully be said. One turns to-day with interest back to *The Practical Teacher* for February of the year 1892 to read again the account of our representative's interview with the "Bristol Authority on Elementary Education," who laboured in the boys' school at Avon Vale, "in a corner of the dingy, dilapidated, depressing, and 'slummy' regions of which East Bristol is composed." And reading this paper once again, one sees all the elements which go to make the man who is bound to rise—the humour which lightens the weight of the work, the missionary zeal (no invidious comparisons are intended), the firm grasp of the fact that education is a social matter and not mere mental cramming, the determined attempt to rise above the ordinary in matters of school method, the fearlessness even of the Education Department and all its works! As one of our old contributors, we offer our very sincere congratulations to Dr. Macnamara. May his shadow, literally, never grow less!

Dr. Macnamara.

T. J. MACNAMARA, LL.D., M.P.,
Parliamentary Secretary to the Local Government Board.

IF the post of danger is still the post of honour—which Sir A. Swettenham might be inclined to deny—Mr. M'Kenna is a much-honoured man. We confess that we are not yet quite familiar with our new chief's educational opinions, but that is a detail. On the whole, the best thing that could happen in the sphere of English elementary education would be the ignoring of the subject for the next ten years by the professional politician and sectarian. Meanwhile, matters which are truly educational and of real moment would advance by leaps and bounds. The new President will find his department very busy, very serious, and very much concerned about many matters with which it ought not to trouble itself. Its duties are, broadly, those of administration; and the department which concerns itself with the issuing of "suggestions" might with advantage be given a very long vacation, or employed, say, in that branch of the work which aims at securing a sufficient supply of teachers properly trained for their duties. If the new President is thirsting for legislative laurels, let him tackle the really important matter of the provision of sufficient and efficient secondary education. He will earn the gratitude of all except those whose gratitude would do little credit to their patriotism.

The New President.

EDUCATIONISTS on every hand have learnt with regret of the death of Sir Michael Foster, and especially those whose stepmother is the University of

BRITISH MUSEUM

London. He was distinguished alike as a physiologist, an educationist, and an author. It is an easy matter to sneer at the limited aims and narrow views of the old Science and Art Department, with which Sir Michael Foster and Professor Huxley were closely associated in days now long gone by; but even that much-maligned institution had its part to play in the slow and erratic development of English higher education. By the death of Foster the University of London has lost one of its most distinguished graduates, for it was at University College that he received his medical training, and his degree of M.D. was obtained from what has been variously described as "the smugs' university" and the "university of the village cobbler." The position now held by physiology among the recognised sciences is due, in a great measure, to Foster's devoted efforts, and the active movement for school instruction in the laws of health had no firmer supporter than he.

The late Sir Michael Foster.

* * *

THIS new educational association apparently intends to work somewhat on the lines of the Classical, the Modern Language, and the Mathematical Associations, and it has all the vivacity and eagerness of youth. Its objects are (1) to afford opportunities for intercourse and co-operation amongst all those interested in English language and literature; (2) to help to maintain the correct use of English, spoken and written; (3) to promote the due recognition of English as an essential element in the national education; (4) to discuss methods of teaching English; (5) to encourage and facilitate advanced study in English language and literature. We note that Miss Clara Thomson, whose books on English literature we all know and value, is an active member of the Association. May we, as outsiders, suggest a method of procedure to the committee of the new body? Let a class be formed of examiners in English literature and placed in charge of Miss Thomson. Until these people are effectively dealt with, methods of teaching English in our schools will remain as before, and the esteemed publishers of the Clarendon Press editions of Shakespeare need not tremble for their sales. Those of our readers who wish to join the English Association should apply to Professor Boas, at the London County Council Education Offices, Victoria Embankment. The subscription of ordinary members is five shillings per annum.

The English Association.

* * *

THE ninth annual meeting of the Moral Instruction League was held on the evening of February 5 at the Medical Examination Hall, General Sir Charles Warren, a vice-President of the League, presiding. An address, summarised below, was delivered by Professor J. H. Muirhead, M.A., LL.D., Professor of Philosophy at the University of Birmingham, on "Moral and Religious Education in Schools." The annual report of the League records remarkable progress. The propaganda resulted, in July last, in the Board of Education making provision in the Education Code for Moral Instruction in the ordinary curriculum of all public elementary schools in England and Wales. Moral instruction of a systematic kind is now given in the schools of forty-eight education authorities, the Surrey, Cheshire, West Riding of Yorkshire, and other important authorities, adopting the League's graduated syllabus of moral instruction and training in citizenship. The report embodies valuable testimonies from educational officials and teachers as to the proved value of the instruction given. The League has appointed an international correspondent, through whose agency a similar league has been started in Germany, with a considerable and influential membership. The League has published a series of valuable graduated moral-lesson text-books for the help of teachers and parents. Its income has increased during the year by £200, and its membership by one hundred.

Moral Instruction.

* * *

PROFESSOR MUIRHEAD commenced by commenting on the importance now attached to the moral and religious aspect of education. Of all the changes in education, there was perhaps none more striking at the present moment than this change in the centre of gravity. They had come to look at education more from the point of view of the will than of the intelligence, of character rather than of faculty, and to see that an education that did not fundamentally affect and develop character was not worth anything at all. In a word, what was important was not so much what they taught children, but the use they were going to make of the faculties they acquired. That depended upon the ideals of character with which they went forth into life. Hence the importance of selecting those studies which dealt especially with what was admirable in life. History and literature were two such studies. They had not that central place in school curricula which ought to be accorded them. One of the indirect results of the emphasis on the importance of character-forming was that history and literature would attain that place. Ought more to be done in the direction of character-forming than could be accomplished by utilising indirectly such humanistic studies? Ought organised systematic moral instruction to be aimed at? He thought that the efforts of the Moral Instruction League in this direction, as supplementing what could be achieved by more indirect methods, were beyond all praise.

Professor Muirhead.

* * *

HE did not wish, the professor continued, to be dogmatic on the subject. The main thing was not that there should be direct ethical teaching, but that all instruction should be ethical. This was what people meant when they talked about an atmosphere, and with it a religious atmosphere would be a good thing. Without it, it would be little else than a stagnant vapour. Speaking of the "religious difficulty" in education, the professor remarked that he had been coming lately to think that perhaps, after all, what was called secular education, if it were permissive, might not be so bad a thing, and that it might be only another name for their ideal in this matter. His personal ideal was that they should provide a place in the curriculum for moral and religious instruction, call it what they liked, and then leave it entirely to the teacher to deal with it as seemed best to him. If that were done, he was convinced of two things —firstly, that there would be few head teachers who would turn the Bible out of the schools; and, secondly, there would be fewer still who would abuse it in the interests of any form of sectarianism. He stood for the freedom of the teacher in the widest sense of the word; but apart from all the indirect ethical influences and agencies in the school, he wished to provide a particular place in the curriculum in which the teacher might

The Main Thing.

speak intimately, if he cared to, of the things of the heart and the will. The main thing was character, and character could only be born of character. His own ideal of a teacher was summed up in the words on the memorial tablet of his tutor in his old college chapel: "He loved great things, and thought little of himself. Desiring neither fame nor influence, he won the devotion of men, and was a power in their lives; and, seeking no disciples, he taught to many the greatness of the world and man's mind."

* * *

The Exemplar.

FOR ourselves, we greatly fear the danger of too much moral talk. Sermonising and the direct pointing of a moral, as every practical teacher knows perfectly well, are anathema to the British boy or girl of the right sort. What moral ideas our school pupils are capable of assimilating and using as the springs of action are chiefly drawn from their personal observation of the actual practice of those who are placed in authority over them, as well as from well-directed instruction in literature and history, the two great instruments for the development of moral judgment. When boys and girls play the game, it is because some one whom they love would have them do so, and would probably be hurt, or even angry, if they fell short of the mark. They need at every step an exemplar, who must be a person known to them, and must be entirely trustworthy. Teachers who feel their own responsibility, while honestly trying to live up to it, feel also the necessity for diverting attention to a higher model; and here is evident the psychological correctness of the Christian idea. And when, as educators, we have done all this, there remains the necessity for a helper in the time of crisis—some one to take the hand and nerve the spirit in the crucial moment which recurs for young and old. Then, in spite of all theories, there rises to the lips a cry for help, which old-fashioned people call prayer— But we are getting into deep water.

MR. REGINALD M'KENNA]

Photo by] [*Elliott & Fry.*

Battersea to Egypt.

MR. SIDNEY H. WELLS, Principal of the Battersea Polytechnic, has been appointed Director-General of Technical Education in Egypt. It is not only the Battersea Polytechnic which is to lose the invaluable services of an energetic administrator and a wise educationist, but also the Board of Education, the University of London, the City and Guilds, the Association of Technical Institutions, and the Incorporated Association of Headmasters, as well as a body which needs at present all the strength and wisdom it can muster—the Teachers' Registration Council. Mr. Wells visited Egypt last autumn, and again at Christmas, and has already drawn up a report and a scheme of work for the future. The rest will be a matter of administration—no easy task, as Mr. Wells himself understands to the full. Naturally he is to be chiefly concerned with the technical education of the native population, but this includes also the adequate preparation of the pupils for making the best of the curriculum of the trade schools. The new Director-General, who is not taking up his duties until October next, has our sincere wishes for his welfare and success. If the technical education of Egypt is not quickly and soundly organised on a firm basis, it will not be the fault of the newly-appointed official.

N.U.T. NOTES.

Training of Teachers.

I CAN hardly recall a time when the question of "Training of Teachers" was not under consideration by some organisation or other; and certainly the executive and its committees have devoted scores of anxious hours to the important topic. For some months past a sub-committee of the Education Committee, strengthened by the inclusion of Mr. A. L. Cann, B.A., Principal of the Manchester Pupil-Teachers' College, has investigated the subject from almost every conceivable standpoint, and its labours are not concluded at the time I pen this paragraph. The avowed intention of the Secondary Schools' branch of the Board of Education and its emissaries to close all the pupil-teacher centres, and force their students into schools of the old grammar

school type, has been fought with all the influence the N.U.T. can command; and on the very eve of his retirement from the Board of Education, Mr. Birrell practically promised an influential deputation that local education authorities should have a comparatively free hand in the matter. Meanwhile, until the new President "gets into his stride," the bureaucrats (not to say autocrats) of South Kensington strive to effect their fell purpose, and the weak-kneed and weak-backed authorities will, in some instances, give way. The Association of Education Authorities has rendered splendid assistance in the matter of preserving the pupil-teacher centres, and the executive hope that, later on, the County Councils' Association will act similarly. The position of the pupil teacher in rural districts differs greatly from that of his urban *confrère*, and a variety of suggestive queries, submitted by Mr. Ernest Gray, M.A., has occupied the attention of the before-mentioned sub-committee two entire sessions. Its conclusions on this point are at present "confidential," and must be reserved for a later period.

Mr. Sidney H. Wells.

I CONSIDER that no boy or girl ought to be allowed to become a pupil teacher without his (or her) guardian understanding clearly that, at the close of the apprenticeship period, such boy or girl must undergo a period of further training. It should be quite evident, when the age of eighteen or nineteen is reached, whether the teaching profession is the correct avocation for any young man or woman. The palpably unsuitable, either through lack of adequate brain power or the physical and temperamental qualities requisite in a successful teacher, should be entirely and ruthlessly excluded from the schools forthwith. Their lives ought not to be allowed to become a perpetual burden either to themselves or to their potential charges. The obviously fit amongst the men should be *compelled* to devote two—or, better still, three—ensuing years to a period of further training, either at one of the residential colleges, or at an institution attached to one of the universities, or a college of university rank. The tendency to establish "Local Authority" colleges is one, in my judgment, fraught with the gravest tendencies to evils, both educational and professional. Nothing can be conceivably worse than, for example, a Nottingham scholar to be a pupil teacher in a Nottingham school, then to be trained at a Nottingham college, finally to return for the rest of his professional career to a Nottingham school. And, *mutatis mutandis*, the argument applies equally all round. All future new training establishments should be provided by the State, for the teacher's is essentially a national work. Men who cannot obtain a diploma *at least* equal in value to the certificate of the Board of Education by the time they are twenty-five years of age should automatically cease to be recognized as teachers in the primary schools. To the peculiar position of the women I hope to refer next month.

After the Apprenticeship.

A. C.

NOTES FROM THE NORTH.

ON the failure of the Scottish Education Bill in 1904 a movement was inaugurated by several prominent educationists, and as a result there was formed the Scottish Education Reform Association. The objects the Association proposes to devote itself to advocating are:—(1) The creation of large areas in which elementary and secondary education should be administered locally by the same authority; (2) the establishment of a Representative National Council, to be consulted by the Scotch Education Department in matters of administrative policy; (3) the enlistment of the co-operation of the universities and other institutions for higher education in developing and guiding the school education of the country. The Association embraces in its membership educationists belonging to both political parties, and has, up to the present time, conducted most of its meetings privately. Its most recent meeting, however, was held in public, and was attended by a large and representative audience, in some measure due to the fact that Mr. R. B. Haldane, Minister of War, was to deliver his valedictory address as President of the Association. Than Mr. Haldane there is probably no one more fitted to give a lead to educational reform. In the course of his address he referred to the value of the Association as a sort of watchdog upon the Government. But as a faithful watchdog must always be a dog who could be trusted to bark, and, if necessary, to bite, and have a character above suspicion, it would not do to take one whose proper domicile was inside the House and whose business it was to make friends with those who were there. So it came about that the President of the Association should no longer be somebody who was inside the Cabinet. Not only on grounds of expediency, but on high constitutional grounds, that was almost essential. He did not mean, however, that his interest in Scottish education would be less keen or less complete than it had been before.

Scottish Education Reform Association.

MR. HALDANE dealt at some length with the important subject of the training of teachers. More and more, he said, the conviction had grown upon him that what they had to look to in Scottish education in the days ahead depended upon what they could look for in the Scottish teachers. They were not only the servants

Training of Teachers.

of the State; they were also the general staff of the State, who had to advise the State at all times. Everything turned upon them in their corporate capacity, and on their *esprit de corps* depended much of what the future had for them. Nothing had given him deeper satisfaction than the definite step forward that had been taken in bringing the teachers more closely into relation with the universities. It was only a beginning. Co-operation was wanted between the teachers and the university in a more thoroughgoing sense than they had yet known. It was to the universities that he looked to set an example, to fashion the ideals according to which Scottish education was to be moulded. The teachers mattered more to the schools than anything else. Unity of knowledge was one of the ideals which must be set before the teacher. That meant that the teacher himself must be a man of large and comprehensive views. It meant that he must not be a mere specialist, but that he must recognise that human knowledge was something developed, something far-reaching, the various stages of which were not separated and cut off from one another, but made up a whole which could not be separated from the other intellectual and moral surroundings of the teacher. That should be a principle of the educational system of the future. It would give the larger outlook, that greater freedom and capacity, which education in the true sense could alone bring to him who possessed it.

* * *

THIS line of thought led Mr. Haldane naturally up to the question of university reorganisation. There was nothing, he said, that impressed itself on his mind more than the necessity for reform in Scottish university arrangements. If the teachers were to be trained, there must be considerable elasticity; access to the university must be easy and yet difficult. They did not want a man there who was not fit to take a university training; and if he was not fit to take that, he was not fit to be a Scottish teacher. On the other hand, they did not wish access to the university to be a strait and narrow gate, accessible only to people who approached by one particular path. If they would secure a high standard in fashioning that elasticity, they would have to give greater individual freedom to each of the Scottish universities. If they freed the Scottish universities, so that they might pass ordinances which would open their territories still wider and give them a larger range in subject and vision and a greater elasticity in fashioning their degrees, it was, to his mind, certain that there would be no lowering of the standard—there would be a raising of the standard. They would have much greater freedom to co-operate with technical institutions; they would have a freedom and power of enlargement which would operate for the benefit of the teaching profession. If teachers were to go through the arts and science courses at the university, and to take their degrees, it must be remembered that they were men preparing themselves for a very special and skilled work in life, and it must be seen to that the degrees taken represented the kind of training that the teachers wanted. The freedom of the universities was vital to the success of the new movement in Scottish education.

University Reform.

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THE Higher Education Committee of the Institute has had under consideration the question of the training of the junior students created under the new scheme of training. The Committee recommends:—(1.) That a satisfactory knowledge of the mother tongue should be a fundamental requirement in the granting of an Intermediate Certificate. Distinct deficiency in English should in no case be held as being compensated by excellence in other subjects. (2.) That the course of study for junior students should provide opportunities for preparation for the university preliminary examination. The Committee does not consider graduation as being necessarily the natural end of every student's training; but, convinced as it is of the desirability of making teaching more and more a university-trained profession, it urges that no junior student of capacity should be prevented from entering the university through lack of opportunity. The present requirements of the preliminary examination need revising; but pending such revision, the course of training for the teacher should be so adjusted as to offer the facilities necessary for graduation. Further, and with the same end in view, the Committee recommends that students who show exceptional proficiency in drawing, music, manual work, or needlework shall be exempted from further study, especially during the last year of the junior student course. It also recommends (3) that the centres for junior students be sufficiently numerous to minimise as far as possible the necessity for students travelling or living from home; and (4) that only in rare instances should the junior student course be less than three years. With regard to the important question of practical training, the Committee recommends that until centres gain further experience it is not desirable that the number of hours demanded for practical training be uniform. The Committee, however, is of opinion that, generally speaking, maximum efficiency will be attained by the concentration of the practical training towards the end of the student's course.

The Institute and Junior Students.

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THE Higher Education Committee has also given consideration to the proposal to alter the date of the Leaving Certificate examination. It recommends the retention of the present date on the following grounds:—As the Leaving Certificate examination is the objective of the year's work, the present date maintains the interest and the attendance of pupils till the end of the session. Theoretically an examination should be merely an incident in a progressive course, but it is felt that many would practically consider the examination and the end of the session as coterminous. At present there is a school year extending from September till June, interrupted only by two or three short intervals; whereas the change would mean, in effect, for many pupils, a shortening of the session by three months, more or less, when Easter happened to fall in March or early in April. By the proposed alteration, also, pupils who have to change their school would be at a greater disadvantage than hitherto by their not being present at the beginning of the session's work. Further, Easter is a time when, physically, pupils are least fit to meet the demands of such examinations. This recommendation was before the General Committee of Management at its last meeting, and formed the ground of a very animated discussion. On a division, the recommendation of the Committee was carried by thirty votes to twenty-six, so that it appears that the teaching profession as well as School Boards is about equally divided on the question. The

Change of Date of Leaving Certificate Examination.

Department will probably in the end take its own way, since there is such a division of opinion.

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Officials.

THE General Committee of Management at its last meeting agreed to raise the salaries of its permanent officials. The Organising Secretary and Treasurer, Mr. S. M. Murray, received an increase of £50, thereby making his salary £500. Mr. J. Laurence, General Secretary, who does not devote his whole time to the Institute, received an addition of £20, and the Secretary to the Board of Examiners £10. For the position of President there have been two names proposed. Dr. Alexander Morgan, Rector, Church of Scotland Training College, Edinburgh, has been nominated by the Edinburgh Branch, while Dr. Lawson, Rector, High School, Stirling, has been nominated by the Stirling Branch. There are rumours also afloat that a third nominee will soon be in the field. For the Vice-Presidentship as yet only one name has been proposed—that of Mr. Alexander Small, Glasgow, a prominent class teacher.

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Increase of Membership of the Institute.

GREAT efforts are being made in various associations to increase the membership of the Institute. This year the Institute celebrates its diamond jubilee, and it is felt in many quarters that this important event should be celebrated by a large accession to the ranks. According to the preliminary statement attached to the rules of the Institute, we find that at a general meeting of the teachers of Scotland of various Christian denominations, held within the High School of Edinburgh on Saturday, September 18, 1847, it was agreed that, for the accomplishment of certain objects specified in the preface, an association, composed of the teachers of Scotland, to be called the Educational Institute of Scotland, should then be formed. The Institute did not, however, obtain its royal charter till May 13, 1851. As showing that some branches of the Institute mean to make a great endeavour to enrol within their ranks all the teachers of the district, it may be stated that at the recent meeting of the Stirling Branch no fewer than one hundred and forty-three new members were nominated, while at the last meeting of the Glasgow branch four hundred and fifty new names were proposed. If every branch in Scotland shows a like zeal and success, the year 1907 will be one of the best in the annals of the Institute. R. D.

"TAKEN FOR GRANTED."

BY PROFESSOR JOHN ADAMS, M.A., B.SC.

FROM the teacher's standpoint all books on psychology fall naturally into two classes—those that contain matter that he can apply to his work, and those that do not. Notable among the first class are the writings of James and Stout. The teacher, in reading them, cannot fail to make practical applications all along the line. Certain other works on psychology do not invite the reader to take any liberties with them. They are self-contained; they "stand in their own grounds;" they are kept select by a barbed-wire fence of technicalities. To the more friendly class belongs a book that has just been published (Macmillan and Co., 10s. net) by Professor William Mitchell of Adelaide University, called *Structure and Growth of the Mind*. Parts of the substantial volume are, no doubt, as difficult and technical as there is any need for, but there are oases in which the practical teacher cannot fail to find both profit and pleasure. Unless he has had a pretty thorough philosophical training, he must not be disappointed if he finds the first hundred pages leading him into temptation. But whatever else he skips, he should make a point of including in his reading chapters vi., vii., viii., xii., xiv., and xvii.

It is the mark of a strong book that the reader can disentangle one or two important ideas running through the whole and making a sort of foundation. Professor Mitchell tells us that much of our knowledge of even the commonest things in life is "in that perilous and important state which we call 'taken for granted.'" Lest there should be any doubt about his meaning, he goes the length of giving a definition: "A fact, whether a particular fact or a law, is taken for granted if, having previously formed an explicit thought of it, we now use the knowledge that we gained without having to form the thought again."

He next proceeds to ask how it feels to take things for granted, and decides that it really does not matter how we feel, the important thing being, how does this taking for granted affect the course of thinking? Professor Mitchell makes all the proper distinctions between implicit thought and what he technically calls taking for granted; but for the practical teacher the thing that counts is that the whole work of education may be reduced to a process of increasing the number of things that we can take for granted. Further, the method by which the number is to be increased is indicated. A thought must be explicit at least once in the course of the experience of an individual, in order that he may relegate that thought to the region of the taken for granted.

This raises the whole question of the relation of consciousness to the educational process. Is it true that every bit of knowledge that we possess has passed at some time or other through our consciousness? Is it not possible to acquire knowledge unconsciously—to grow into it, in fact? On this point Professor Mitchell is quite clear. There is no incubation into knowledge. In his own words, "There is no unconscious getting of knowledge." This quite agrees with the presentational psychology that demands co-presentation in consciousness as a condition of the building up of apperception masses. But the teacher is naturally interested to know whether it is not possible for a certain amount of knowledge to soak in from the mere surroundings. From wall maps kept continually before the pupils' eyes some teachers expect a certain amount of knowledge to percolate into their pupils' minds, even though the maps may never be brought directly into a definite lesson. But here there is obviously some confusion about the meaning of consciousness. The pupils are conscious of the maps though their attention may not be deliberately directed to them; but in educational matters we are apt to limit the word conscious to cases in which matters are brought to the notice of the pupils with the definite purpose of adding these facts to the pupils' store of knowledge. We have, for example, M. Gustave Le Bon's *Psychologie de l'Education* (published last year), practically written round the motto that appears on the title-page—"Education is the art of making the conscious pass into the unconscious." On the psychological side the principle is sometimes stated in the form that progress in education consists in rele-

gating activities from the upper brain to the lower—from the cerebrum to the cerebellum. There is enough truth in this crude physiological reference to make it useful as an illustration, though naturally it will not bear minute analysis. It may give satisfaction to some readers—though Professor Mitchell would strongly disapprove—to call the cerebrum the organ of "taking for granted." The lower brain and all the subordinate nervous tissues are always functioning in an atmosphere of taking for granted.

At first sight there seems to be an inconsistency in Professor Mitchell's teaching. For example, we find him saying, "In learning skill there are always parts where to try is a better way of learning than to think how;" but in trying there is still consciousness, though there is not that reasoned consciousness involved in thinking how.

A more troublesome case is the way in which words acquire a meaning. Certain words, no doubt, pass into our experience directly through conscious effort. We encounter the word "levin" in our reading. We do not know what it means. We refer to the dictionary, and thus consciously acquire the knowledge that the word is an obsolete poetical equivalent for lightning. But there are very many words that we use every day, but that have come to us in what may be popularly called an unconscious way—that is, we have grown into a knowledge of the meaning of them without having been aware of the process. We are not indebted to the dictionary for our knowledge of the meaning of such words as "of," "in," "why," "that." But Professor Mitchell's whole system provides an excellent explanation of this apparently unconscious development of meaning. He is insistent on the unity of mental life. It is not a thing of shreds and patches, but a definite organism having a structure. All the same, the evolution of this structure is carried on by an unending process of increasing the number of things that can be taken for granted. Though we may have no record of our first encounter with the word "of," there must have been a period at which it gave us trouble: we wrestled with it in different contexts, and finally began to see how the thing worked. As soon as we reached this stage we went on to something else, and ever after "of" has been taken for granted.

It is comforting to learn that Professor Mitchell finds a place for the teacher even though the result of the teacher's work is not immediately evident. The teacher must nurture the mind; and though the result of this nurture may not appear for many years, the result is none the less to the teacher's credit. Even when the result "does not come for a year or two, it may still be the earning of nurture and none of it the free gift of our years." In fact, the teacher's influence seems to work in two quite different ways. From one point of view the teacher's business is to make his pupils conscious of what they already know; from another point of view his business is to make his pupils conscious of certain new facts, and then to work these up into the organic whole of previous knowledge. It may be our business to bring to clear consciousness things that the pupil has always taken for granted, in order that he may return to them with a better command over them, and with a fuller insight into the possibilities of power that are involved in them. Sometimes, no doubt, this bringing to clear consciousness of knowledge already possessed becomes trifling, and resolves itself into a mere matter of words, as in the case of the famous M. Jourdain, who was greatly charmed to find that he had been speaking prose all his life. Yet every intelligent teacher will be able to illustrate from his own experience the wonderful increase in the value of old knowledge when brought into new relations. Through co-presentation in consciousness the pupil may not have learned a single new element, but old elements may have been so combined as to produce an entirely new and very valuable compound. The more he considers it, the more clearly will the teacher find that his whole life is spent in manipulating things that are taken for granted. Sometimes his business is to introduce doubt into the minds of pupils, so as to make them unable to take certain things for granted; at other times his business is to present matters in such a way that for ever after certain relations will be necessarily taken for granted.

RELIEF MAPS IN TEACHING GEOGRAPHY.

BY DR. JAMES KNIGHT, ST. JAMES'S SCHOOL, GLASGOW.

EVERY teacher of junior scholars has felt the difficulty of getting them to understand the abstractions represented by a map, to read into the conventional signs for mountains, rivers, and lakes the real data upon which these conventions are based, so as to visualise the country, and thus arrive at genuine geography in the literal sense, a description of the earth. Of recent years very much has been done in the way of orographic maps, indicating heights of land and depths of sea by differential colouring. Kiepert of Leipzig and Berlin led the way in this connection, and his example has been followed by several British firms, notably Phillips and Nelson; while every tourist knows and esteems the unrivalled reduced survey maps on a scale of two miles to the inch published by Bartholomew. Still, this kind of stereoscopic vision—the faculty of translating into hill and hollow even such admirable orographic drawings as these last—has to be awakened in young children—say in the first two standards; and for this awakening, which is very often quite sudden, many devices are to be tried.

For some time past I have been making relief maps of different parts of the country, not so much for systematic geography as to help in explaining geographical terms, and to lead up to the ordinary wall map. On one occasion a small map, eighteen inches square, had been made in modelling clay upon one of the small boards used for freearm drawing. The district shown was the "kingdom" of Fife and the adjacent districts from Strathmore to the Lothian plain and the Pentlands. The teacher had been using this for a week or so, but was conscious all the while that the scholars were laying the two objects, relief map and flat map, side by side as two different ideas, instead of superposing them, to see the one in the other. One day, however, the little raised map fell, and the clay, quite dry by this time, was entirely knocked off by the shock, leaving behind, however, traces of its presence by a darker stain on the millboard—in short, a very perfect outline map on the flat. The class "caught on" at once, and by that happy accident acquired the lasting power known as the geographical eye—an eye for a map.

Since that time I have experimented with various substances. Clay is cheap and easy to work; but it is somewhat dirty, not easily kept at the proper con-

sistency, and dries very rapidly and unequally, resulting in cracks and disfigurement generally. Plasticine is far too expensive on the large scale required for

THE COUNTY OF FIFE.

classes of sixty, and it is, moreover, rather hard for easy working. Clay allowed to dry, then powdered, and mixed with crude glycerine instead of water, makes a splendid material of any required degree of softness, and retaining its plasticity unimpaired for a long time. A sample by me is over a year old, has been exposed to air all that time, and remains as soft as the day it was mixed. It has the disadvantage of not being waterproof, as glycerine itself is soluble in water; and it is therefore not suitable for models where water is used repeatedly for demonstrating lakes, bays, etc. After some trials I have succeeded in making a plastic putty which serves very well; that is to say, it remains soft for at least a year, is yet firm enough to retain its shape, will stand water, does not soil the hands, and costs no more than twopence a pound or so. Plaster of Paris, the substance usually taken for modelling purposes of this kind, sets far too rapidly to admit of correct and painstaking work: its proper use would be to take a cast for reproducing a map already made. For ordinary class demonstration of a temporary nature, common dough, made from flour in the ordinary way, is very serviceable. It is especially useful in building up a relief map by the method of contours, presently to be described. Permanent maps are best made of ordinary putty, which may be coloured either before or after the operation; and perhaps a description of one of these may illustrate the process for all.

My permanent relief maps are all forty-eight inches by thirty, mounted on sheets of three-ply veneer for lightness and strength, and framed in a simple but strong moulding to prevent warping. The district chosen for modelling was the Cumberland Lake District, and the scale that of Bartholomew's maps, two inches to the mile. The first operation was to procure the district maps concerned—Sheet 2 of the Scottish series, and Sheets 3 and 5, with a small part of 2, in the English series. These are most useful mounted on cloth, but not dissected; they are published at two shillings net, and members of the Cyclist Touring Club are reminded that the secretary of the C.T.C. supplies them to members at 1s. 8d. The sheets are pinned on the map-board so as to get the proper adjustment of area, and a tracing is then taken from them while in position. Ordinary tissue paper rubbed with oil till transparent is good enough for this purpose; the tracing paper of professional draughtsmen is too expensive.

The tracing need involve at the outset no more than the outline, the highest hills should be marked by a small cross, and one or two leading lakes, rivers, and even railways may be traced in—more as guides in the subsequent modelling. Details belong to a much later stage. When the tracing is finished, it should be transferred to the map-board by carbon paper, marking only the elements above-mentioned. Wherever there are large masses of hill, small nails should be driven in at the cross marks to support the weight of putty which these heights demand, and to prevent sagging if the map is built in a vertical position, the most convenient for working.

The projection of these nails will, of course, depend upon the relation of vertical to horizontal scale. My

THE ENGLISH LAKES.

favourite practice is to make that ratio 10 to 1: that is, taking Bartholomew's map scale of an inch to two

miles—say 10,000 feet—we get a vertical scale of an inch per 1,000 feet; and this, in the Lake District, means a maximum height of three inches for such hills as Scafell, Helvellyn, and Skiddaw. A tracing having been made of the 500-feet contour line, the working material—putty of the consistency of dough—is rolled out with a rolling-pin so as to form a sheet a quarter of an inch thick, and this is fitted on to the board on the *outside* of the contour line in question—that is, from the coast to the 500-feet contour, leaving the centre blank. Now with the fingers bevel off this first band so as to make it slope gradually from the coast, thickness nothing, up to the contour line, thickness half an inch. Trace in the remaining contours for every 500 feet of height, and proceed upon the same principle, bevelling each layer so as to avoid "steps and stairs," and lead up to the proper thickness, one inch per 1,000 feet. This is satisfactory enough for broad land masses

Caledonian Canal.

like the plain of Carlisle, the Eden valley, and the coast belt generally.

For the complex system of radial valleys spreading out from Scafell and the Langdales, I prefer to fill up solid to the full height—3,000 feet or so—and then scoop out the valleys. It is quicker, easier, and, after all, an imitation of the natural process. An hour a day will finish such a map with rough accuracy in less than a week; then, if finer details are desired, the surface is graded nicely with soft putty so as to fill up any too suggestive cliffs and give the whole that soft roundness of outline which is presented by every bird's-eye view. When this is fairly hard, more details may be taken from the survey map by means of the tissue paper, and transferred directly to the surface without carbon paper, the pressure of an ordinary pencil being sufficient. Rivers and lakes may now be painted on with oil colours. I use white for these, red for towns (following the shapes in Bartholomew and not the conventional circles), ordinary pencil for railways, and blue for sea. The map in question may be made very effective by tinting the low-water mark in light blue, so as to show the extensive sands of the Solway and Morecambe Bay. Finally, the whole is varnished to consolidate the surface. The total cost of such a map—wood, frame, putty, complete—is not more than half-a-crown; and the time expended on it varies from five to ten hours, depending on the degree of accuracy and the amount of detail expected.

The use of contours may be very easily explained to a class by using clay, dough, or other plastic material, rolled into sheets of uniform thickness, and then worked up on the flat by paper "shapes," as in dressmaking. Take such a map as Arran (Scotland, Sheet 3) or the Isle of Wight (England, Sheet 33)—the former by preference, as it shows steeper gradients and more geographical variety. Trace the outline of Arran with tissue-paper as aforesaid, cut this out, and, using it as a shape, cut off the outline from the sheet of clay. Now trace the 500-feet contour, and use it in the same way, placing the second layer upon the first in the correct position, as shown by one or two identical points on each "shape." A map built up in this way shows a series of steps and stairs, the contour lines being shown as half-inch cliffs. When the principle of the different levels has been grasped, a few minutes will suffice to bevel off the edges and exhibit the map as a more natural model, with the gentle slopes which even the Arran hills display to the personal observer.

It goes without saying that a very fine degree of accuracy may be obtained by cutting out shapes of this sort for every hundred feet, and using layers of uniform and small thickness—say a tenth of an inch; but the time involved would run up considerably. Visitors to the Conservatoire des Arts et des Métiers in Paris will remember a very fine model of that city in plaster, to a true scale, vertical and horizontal alike, showing contours for every ten metres. In such a case no bevelling is needed—the terraces are so minute as to be practically invisible. For class demonstrations on the subject of contours and map-making, sheets of thick cardboard may be used, one for every 250 feet of rise, thus following the contours of the inch survey maps.

The staff of St. James's will be very pleased to show samples of these maps to any teachers within call.

WELSH EDUCATION.

On the eve of going to press with this number we receive news of a new departure in educational administration. This is the establishment by the Board of Education of a separate and distinct department to deal with all grades of education in Wales and Monmouthshire. Mr. M'Kenna has decided to appoint a Permanent Secretary of this Welsh Education Department and a Chief Inspector for Welsh Education. The former post has already been accepted by Mr. A. T. Davies, who has been prominently connected with the public life of Wales for many years past, and especially with educational questions and other forms of social work. The new Chief Inspector is to be Mr. Owen M. Edwards, a native of Merionethshire, a graduate of Aberystwyth and Balliol College, Oxford, and a writer well known to all students of British history and literature. Mr. Edwards has been a lecturer on Modern History at Oxford since 1889.

THE USES OF READING.

BY PHILIP GIBBS,
Author of "The Romance of Empire," "Men and Women of the French Revolution," etc.

THE subject is an old one, and some of the readers of this paper may think it a stale one. Yet, after all, though it has formed the discussion of every debating society, though schoolmasters have made it the theme of essays and schoolboys have laboriously endeavoured to find some arguments about it (though in their hearts many of them, with their mind in the football field, "have no use" for reading at all), the last word has not yet been said upon a subject which, old as it is, may always be discussed from new points of view.

For my part, I write not from the standpoint of the serious scholar, nor with the authority of the pedagogue, but rather as a social creature, who is, to tell the truth, more interested in life than in literature. In my opinion, it is better to have a full knowledge of the modern life about one than to be soaked in the philosophy of the ancient Greeks. I believe that it is more profitable to understand the social conditions of our own civilization, to be familiar with the tragedies and comedies of humanity to-day, to feel the pulse, as it were, of the men and women with whom one rubs shoulders along the highways of one's own journeying, than to be able to diagnose with remarkable accuracy the psychology of Julius Cæsar or of other dead heroes.

I have a great admiration for the old-fashioned scholar who puts the world on one side, and lives only in the dream-world of old ghosts. He has his place in the scheme of things, and he is no doubt very happy with himself. But, after all, he is not living according to the ideal of intellectual progress. Of most men it is at least required that they should be alive. They should have a firm grip upon the machine which is never stationary, but speeding swiftly onwards to new conditions, new philosophies, new phases of strife and struggle. Above all, they should have a firm grip upon themselves. That is not so easy; it is increasingly difficult.

This business of life grows more, and not less, complicated as humanity discovers new methods of enjoyment, amusement, and moneymaking. The struggle for existence is fiercer, leisure is only for the few; and success, when it is gained honestly and not by the gambler's lucky fluke, nor by the accident of genius, results only from hard toil and much brain-fag. Yet for this reason life is more interesting than it ever was. Being, for my sins, a journalist, I have seen many phases of life, and on many days of the week I am making fresh explorations of humanity. And I can truly say that in London alone life is of inexhaustible interest and drama, and may never be wholly known by any one man.

Now, where does reading come in in the life of a man who is busy with his own and other lives? Well, it comes in everywhere! You cannot move a step forwards in the knowledge of life without books on your shelves and in your brain, because they are the keys which open the doors of life. They unlock the secrets of the human heart, and reveal the mysteries of humanity. A man may be in the very whirlpool and understand nothing of its significance. I know a man who has been round the world several times and cannot knock two ideas together about what he has seen. I know many a husband who sits opposite a wife at the breakfast-table, and has no more notion of what goes on in her heart than he has of the psychology of Cleopatra. Most of the tragedies, most of those blundering cruelties, most of that trampling of hearts, jarring of nerves, and discords of lives, which are in every suburban street, are caused by sheer ignorance, by lack of trained imagination, and by absence of any sense of humour.

Therefore it is necessary to read. A man who has read the novels of Thackeray, George Eliot, Charles Dickens, George Meredith, and Thomas Hardy knows at least the rudiments of modern psychology. He learns to see virtue in all sorts of queer and unlikely people; to sympathise with the duffers and the failures; to have a more kindly and tolerant outlook upon the crowd; to be more careful of his dealings with the individual. And here I would put in a word for modern fiction, which is too often and too lightly sneered at. There is a great mass of rubbish printed now, I admit, but I am bound to confess that a novel must be very bad indeed if it does not provide one with some new information about some phase of life. The older novelists painted on broader canvases, and we have few giants now; but such writers as Mrs. Craigie (lately dead, alas!), Robert Hichens, E. F. Benson, Lucas Malet, Mary Cholmondeley, Mary E. Mann, Thomas Cobb, Pett Ridge, W. W. Jacobs, W. B. Maxwell, and J. M. Barrie, to name but a few out of a mighty host, are all, in their way, doing something to deal sincerely with modern aspects of life and the problems of society that are now with us. Apart from all amusement and enjoyment which we may get from them, there is the profit of knowledge in those books which enables us to get closer to the heart of things and to understand ourselves more clearly.

And if we would not be stupid owls, blinking in the daylight of modern thought, we must study the works of men who have minted the current philosophy of the time. To take a good place in any society that is decently educated we must at least have read something of Tennyson, Browning, Carlyle, Ruskin, Emerson, Oliver Wendell Holmes, Tolstoy, Maeterlinck, Ibsen, George Bernard Shaw. We may as well hide our heads in a halfpenny paper if we have not ploughed through Darwin's *Origin of Species* or the social forecasts of H. G. Wells.

Putting it at its very lowest, if a man wants to join in the social conversation of intelligent people, instead of sitting mum and glum, he must nowadays have read pretty extensively in the realm of *belles-lettres* and light history. He must have read Pater's essays, and know something about Greek art and the Italian renaissance; he must have the characters of Fielding, Smollett, Richardson, Jane Austen, Scott, Thackeray, George Eliot, Dickens, Meredith, Hardy, and Stevenson in his memory; his knowledge of English history must go as far as Macaulay, John Richard Green, Froude, and M'Carthy's *History of Our Own Times*. But that is the poorest reason. I go back to my original argument, and say that to know life and enjoy it one must be always reading good books.

Take history, for instance. A man goes through life blindfold unless he has read many histories, many biographies, many memoirs. To me, who am pretty ignorant, London would not be the place of romance which it now is if I could not recall a number of historical pictures and portraits. But now I cannot pass

Westminster Abbey on the top of a 'bus without a thrill, or walk through the Temple without the pleasure of meeting Dr. Johnson and "Goldie" and other worthies. To me London is full of ghosts with familiar faces. The very stones bleed beneath my feet. That grim old place the Tower fills me with excitement when I dream of all its tragedies, of its great pageants, of its historic scenes; of such people as Beauchamp and Cobham, Leicester, Dudley, Guildford, Raleigh, Essex, and Queen Jane, helped not a little by the romance of novels by Scott and that half-forgotten worthy Harrison Ainsworth. Even in Mayfair, which to some people is but a little world of dull houses, I meet such ghosts as Beau Brummell, the Prince Regent, Mrs. Fitzgerald, William Montagu, Horace Walpole, Fox, Byron, Lady Jersey, and others who lived in or visited those very same houses.

But history is an everyday necessity. No political situation in modern life may be properly understood without some fair idea of past events. The situation of the Church and State in France is without much significance unless we have gone through the tragic drama of the French Revolution, and read the cynicism and the blasphemies and the philosophy of such men as Voltaire, Diderot, and Grimm. The heart of a Frenchman is not to be understood but by the knowledge of his history and traditions. The situation in South Africa and the late war demanded a very respectable knowledge of colonial history for any one who would weigh the facts seriously without at once flinging his cap in the air and shouting, "Down with old Kruger." Even the facts which tumble over each other's heels in the daily newspapers can only be properly interpreted by much previous knowledge of imperial and Continental and Oriental politics.

Then, what is the use of travelling without some knowledge in the portmanteau of one's brain?

> "Home-keeping youths have ever homely wits."

But the youth may just as well stay at home and seek his pleasure at the music hall, if he goes abroad without having read the history of the country for which he has taken his ticket. Paris is merely a glitter of shops and a collection of ordinary vulgar crowds unless one remembers the scenes that once took place at the Palais Royal, and the Place de Concorde, and the Place de la Bastille; unless one has read the lives and works of men who lived in the houses still standing in the Rue St. Honoré, the Rue Montmartre, or the Rue des Petits Champs. Aix-la-Chapelle is merely an orderly and rather dull German town unless one is haunted by the ghost of Charlemagne. The Rhine itself is not more thrilling than the Thames unless one has read those famous old legends which linger in its castles and vineyards, and the ballads which Schiller sung and Longfellow translated. Antwerp, Brussels, Ghent, and Bruges are but small Continental cities, rather smelly and rather deadly, unless one's mind is filled with the glowing pictures in that wonderful masterpiece and romance, Motley's *Rise of the Dutch Republic;* unless one has been excited by the mediæval glamour of *The Cloister and the Hearth*, and studied the lives and work of such men as Memlinc and the Van Eycks, of Quentin Matsys, Gutenberg, and Erasmus.

Then there is another use for reading—

> "The world is too much with us; late and soon,
> Getting and spending, we lay waste our powers."

There is not one among us who is free from the cares and worries of the world, the dreariness of days of drudgery, the long hours of work on trivial things. It is a blessing to retire for a while with a book, and to forget everything in the enjoyment of imagination. Not all of us may travel, except on a suburban railway or a penny tram. But with a book in an arm-chair we may get away from our own little world for a while and wander in new worlds. If we have got just a little weary of the gossip of fellow-clerks or of our next-door neighbour, we may talk with such good fellows as Dr. Johnson, the Sieur de Montaigne, Richard Steele, Francis Bacon, Shakespeare (whose store of wit and wisdom is quite inexhaustible); with many of the great gentlemen who have lived since the world was young, beginning with Homer and Horace, or with the noble fellows in Plutarch's *Lives*. If we want adventure, we may get at once into the heart of peril in *Robinson Crusoe*, in *Treasure Island*, in *The Prisoner of Zenda;* or if we want facts, in Collins's memoirs, in the memoirs of Marbot, in the lives of all the fighting men and seafaring men and wandering men before or since Drake sailed round the world, or Grenville hoisted his flag on the *Revenge*, or Cook discovered Australia, or Clive conquered India, or the British Empire was printed red upon the world's map. Do you want romance and the dalliance of love? You may have it in cartfuls at fourpence halfpenny to six shillings the volume, or one guinea a year library subscription; and you may have it as you like it, in fancy or fact, old or new, the love of Antony for Cleopatra, of Abelard for Heloise, of Petrarch for Laura, Dante for Beatrice, or of Robert Browning for Elizabeth Barrett—the old, old story with innumerable variations.

Seriously speaking, books are so cheap nowadays that poverty is no excuse for ignorance. And, what is excellent, the best books are cheapest. The new reprints of standard and classical authors in every department of literature put the world of knowledge within the reach of the working man, whereas formerly books were the luxury of wealth. The best books are the cheapest, and the oldest books are the best—nearly all of them. Personally, though my "line of business" makes me read many books hot from the press, I am best pleased when, in a leisure hour or two, I can get back to old favourites and old wiseacres—the poets and romance writers and historians who have gone a little out of fashion. But that is a matter of taste. What I would say to all young men and women, and to old ones too, is, read something more solid than the daily papers; and if you won't read good books, then read indifferent ones.

MUTUAL AID IN NATURE STUDY.

A SCHEME for mutual aid in Nature Study between town and country schools is proposed on the following lines. The Hon. M. Cordelia Leigh, 32 Chester Street, S.W., is hon. secretary. It is suggested that each country school included in the scheme shall send parcels of objects suitable for Nature Study to the corresponding town school, the objects having been previously used for a lesson in the country school. The parcel to be posted once in three weeks from November to March, and once a fortnight from April to the end of October. The average postage of each parcel not to exceed 4d.

The corresponding town schools may send, in return, letters from the older scholars describing interesting details of town life, picture postcards, newspaper cuttings of general interest, etc., previously inspected by the teachers.

The scheme has been started in two affiliated couples of schools. Should the result prove satisfactory, it is hoped to approach the County Councils on the subject of defraying the small cost of postage, the only expense connected with the scheme.

It is hoped to extend the scheme in April. The hon. secretary will be glad to hear of town or country schools wishing to join.

The Modern World

GEOGRAPHY NOTES UP-TO-DATE.

BY E. R. WETHEY, M.A., F.R.G.S.

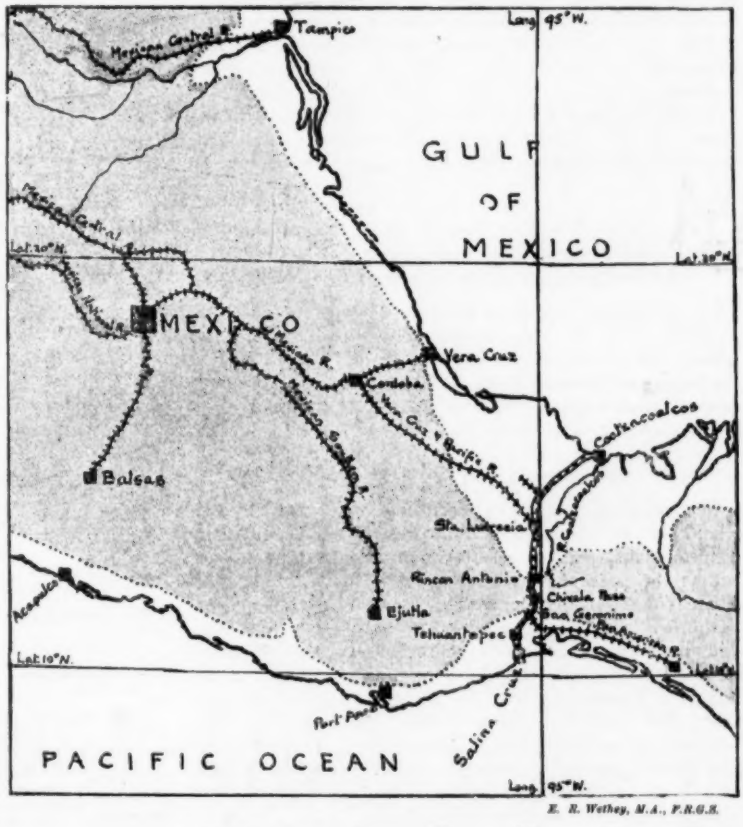
The Tehuantepec National Railway.

ONE of the greatest achievements of the early years of the twentieth century is the completion of the railway across the Mexican isthmus of Tehuantepec. It was formally opened 23rd to 25th January 1907.

As the map shows, it connects Coatzacoalcos, the Atlantic port, with Salina Cruz on the Pacific. The length of track in 190 miles (the isthmus itself is only 120 to 130 miles across), and the time allotted for the journey is ten hours. Evidently the Mexican authorities mean to be careful at first! The track is a single one on a gauge of 4 feet 8½ inches (most of the Mexican gauges are three feet), but it will undoubtedly be doubled if the traffic comes up to expectations. The locomotives are oil-burning (American oil at present, though oil wells have been discovered along the route), as local experience has shown that a saving of from twenty to thirty per cent. is effected by the use of this fuel in preference to wood or coal. Five places *en route* are at present interesting—Santa Lucrecia, where direct communication with Mexico city joins the line; Rincon Antonio, the headquarters of the railway; the Chivela Pass, the highest point (855 feet above sea-level), crossed with gradients hereabouts of one in thirty-two; San Geronimo, the junction for the Pan-American Railway, which is eventually to link up Buenos Ayres with New York; and finally, Tehuantepec, which gives its name to the whole undertaking, though some distance away from the Pacific terminus.

The railway has a special interest to Britishers, for British enterprise and capital have succeeded where others failed. As long ago as 1882 the enterprise originated. A railway, indeed, was opened in 1894, but it was obvious that until it was reballasted, and, above all, rebridged, it had no chance of becoming a great international thoroughfare. Accordingly it was put into the hands of the well-known British firm of Messrs. S. Pearson and Son, Limited, and they have practically built the whole affair over again. The greatest enemies they had to contend with were "geographical"—heavy rainfall and exuberant growth of vegetation, which is what one would expect from the latitude and the prevailing winds. The rainfall they could not stop, but various chemical applications kept down the vegetation. Their greatest feats have been the erection of many splendid steel bridges, and the excavation of port and harbour works which were necessary to enable Coatzacoalcos and Salina Cruz to berth ships of twelve thousand tons. The finest bridge is that over the Zaltepec River at Santa Lucrecia, six hundred and sixty feet long, and built entirely of steel. It was well tested last year by the rains and floods, which, though washing away every single bridge and culvert on the Pan-American Railway, left this—and, indeed, all the other Pearson bridges—quite unharmed. Salina Cruz harbour had actually to be created—an outer portion by means of great breakwaters, an inner harbour by works which included digging out the foreshore. At Coatzacoalcos an ingenious scheme brought the river itself into full service. Converging jetties, each fourteen hundred yards long, now confine the river mouth in such a way that its current is able effectively to scour out the hitherto awkward bar.

A good and paying traffic is assured at once in the sugar that enters the United States from Hawaii. Indeed, a contract for bringing three hundred thousand tons per annum from Honolulu to Salina Cruz has already been entered upon by the American and Hawaiian



E. R. Wethey, M.A., F.R.G.S.

Scale of English miles. 0 50 100 150 200

The Tehuantepec National Railway.
Other Mexican Railways.
Land over 600 ft. (approximately) above sea-level.

Steamship Company, and it was one of this line's steamers, the *Arizonian*, which was the first to inaugurate the new trade route.

Three trade routes may be affected by the opening of this new one :—

1. *The old Magellan route* round South America will certainly suffer, and will be left to sailing vessels. The American-Hawaiian Company has already taken off its steamers. These figures speak for themselves :—

	Via Magellan.	*Via* Tehuantepec.
To San Francisco from London	14,630	7,380 m.
To San Francisco from New York...	14,160	4,230 m.

Incidentally this is a great gain for New York over London; for the mileage of the old South American route was much the same for both, while now London is nearly twice as far off as her American rival from some of the Western markets.

2. *The North American railways* from New York to San Francisco and the Pacific coast may suffer. They are expensive, to begin with—so long a land journey is bound to be—and though they are nominally timed to take twenty days for goods traffic across, the average works out at more like forty. The new route guarantees a regular service of twenty-five days for the journey.

3. *The Panama scheme*, though, of course, it will advance without check, may be affected, on completion, in some slight degree. Here again figures are useful :—

	Via Panama.	*Via* Tehuantepec.
To San Francisco from New York...	5,495	4,230 m.
To Honolulu from New York.....	6,688	5,699 m.
To San Francisco from New Orleans	4,700	3,091 m.

This represents roughly a saving of from ten to fifteen hundred miles for Tehuantepec in the routes from the Atlantic to the Pacific ports of the United States. Still, the fact that Panama is an all-water route should easily counterbalance this. What is more to the point is that Tehuantepec gets a start of at least ten to fifteen years.

The Silver-Mines of Peru.

The mineral wealth of Peru has been known and talked of for centuries. At present, comparatively speaking, this wealth is of little commercial importance; but as the present Government of Peru is doing what it can to exploit its mines,* it is well to refresh our memories from time to time on half-forgotten facts. The silver-mines are, at all events historically, the most famous. We have, therefore, selected them for illustration. The map shows the locality of the chief districts, but only diagrammatically (there are over one hundred, for example, round Huarochiri). It also shows how poorly served the country is with railways, though here things are mending, and there are many schemes of railway expansion moving forward.

Cerro de Pasco is the main centre—No. 2 on the map. Note especially its advantages—a central position, and communication by rail with the Pacific, by river with the Atlantic. Moreover, the soil of the vicinity is well adapted for cereals, no unimportant point in a country where, owing to lack of transport facilities, the food supply for such concentrations of population as mining camps is always a difficult problem. Incidentally the Cerro de Pasco mines are stated to have produced from forty to fifty million pounds' worth of silver in the last hundred years. In some of the mines to the south there are said to exist veins of silver one hundred feet thick and three miles long, almost rivalling the record of the Comstock Nevada or some of the great Mexican finds at Zacatecas.

According to the latest published statistics there are over three hundred silver-mines in operation round Cerro de Pasco, and over two hundred a little farther south; over one hundred and fifty in the districts numbered 3, 4, 5 on the map, and over fifty at Puno, which last-named place would come next to Cerro de Pasco in the enjoyment of geographical and transport advantages. No. 1 (Recuay) is a rich region, but there appear to be no statistics available as to its modern output. No. 6 (Caylloma) is extremely interesting. It boasts of twenty-four mines, some of which were worked by the Spaniards away back in the sixteenth and seventeenth centuries. Now a vigorous attempt is being made by a Chilean company, using British capital and British plant and a British engineer, to reopen and redevelop a larger area. But workings are difficult when coal costs £7 a ton to deliver at the mines!—a good object

E. R. Wethey, M.A., F.R.G.S.

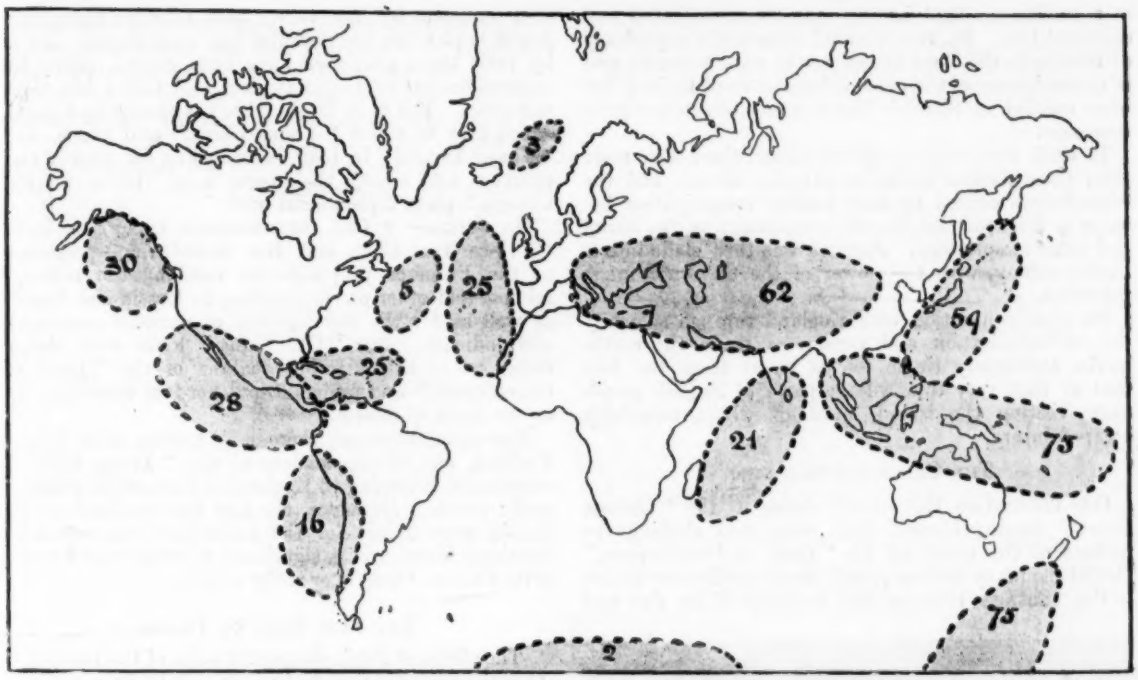
Scale of English miles. 0 100 200 400 600 800

The chief silver-mining districts—
1. Recuay.
2. Cerro de Pasco.
3. Huarochiri.
4. Huancavelica
5. Castrovirreina.
6. Caylloma.
7. Puno.

Chief railways.
Frontier boundary line of Peru—most of it in dispute with the neighbouring countries.

lesson, by the way, on the connection between geography and commerce—and when, owing to the altitude (14,000 to 17,000 feet above sea-level), atmospheric pressure is only eight and a half pounds per square inch. It takes mules or llamas—the only means of transport—two hard days to traverse the mountain roads from Sumbay, on the Arequipa Railway, to the mines. One pass alone tops 18,000 feet. No wonder that the company alluded to has decided to utilise the lakes and streams of the neighbourhood for developing power and electricity, and to lay down a few miles of light railways.

* Men of *any* nationality are allowed to take up claims on the half-yearly payment of £3. The mining industry cannot be further taxed before 1915. No export duty is to be established on mining products.



EARTHQUAKE DISTRICTS OF THE WORLD. (After Professor Milne.) *E. R. Wethey, M.A., F.R.G.S.*

THE WEST INDIAN EARTHQUAKE REGION.

In face of the recent terrible disaster at Kingston, it may be interesting to reproduce a diagram, based on Professor Milne's "earthquake map" which was presented to the British Association in 1905. The figures represent the number of earthquakes which originated in the districts indicated in the five years preceding the compilation of the map, except to the south of New Zealand, where the figures refer to the earthquakes recorded by the *Discovery* from March 14, 1902, to Nov. 23, 1903. According to this, Jamaica is far from being one of the worst regions of the world. Six take precedence of it, two of them in the Western Hemisphere.

CURRENT EVENTS CONNECTED WITH HISTORY.

BY E. M. WILMOT-BUXTON,
Author of "Makers of Europe," etc.

THE EARTHQUAKE IN JAMAICA.

THE great event of the early part of the year has, of course, been the terrible earthquake in Jamaica. On Monday, January 14, about half-past three in the afternoon, the town of Kingston seemed, as an eye-witness says, to "shrivel up." "The buildings crashed together and fell into a crushed mass like eggshells." Immediately after the shock fires broke out in various places, and much increased the general horror. After the buildings had ceased to fall a scene of terror ensued. Thousands of homeless people wandered round the ruined city, many of whom were suffering agonies from wounds received during the collapse. One of the most striking features of the affair was the panic which seized the negroes of the island, who filled the air with ravings and loud screams, which only harrowed still more the already shattered nerves of the white population. This has been the most terrible earthquake that has occurred in Jamaica since 1655; but in 1902 the neighbouring island of Martinique fared still worse, for the capital, St. Pierre, with its thirty thousand inhabitants, perished in three minutes.

Jamaica is the largest of our colonies in the British West Indies. It was discovered by Columbus on May 3, 1494, and under the name of St. Jago he formally took possession of it for the King of Spain. The island was visited in 1596 by a party of English "buccaneers" who had belonged to one of Drake's expeditions, but they did not attempt to occupy it. During the time of Charles the First it was divided into eight districts, each held by a noble Spanish family; and these divisions were probably a source of weakness, leading to its conquest in the immediate future.

In 1655 Cromwell had begun his policy of aggression towards Spain and of strengthening the English sea-power at that country's expense. An expedition was sent, under Admirals Penn and Venables, with orders to conquer the richest islands of the West Indies. They succeeded in capturing Jamaica, but so little was the island then appreciated that the leaders of the expedition were imprisoned on their return for failing to gain the larger and stronger island of San Domingo.

The immense importance of Jamaica, both for its produce and as affording "free trade ports" for the English traders, was soon recognised both by England and Spain, for the latter kept up a constant "buccaneer" warfare until 1670, when the English claim to the island was formally recognised. A few years later the regular export of sugar to England began, and has continued ever since.

During the War of American Independence, when England stood alone against all Europe, Jamaica was in a sad plight. In 1782 the French Admiral De Grasse had attacked the island with his fleet, and it would certainly have fallen into French hands had not Rodney,

in a terrific sea-fight lasting four hours, defeated and captured him. By this splendid victory the supremacy of Britain in the West Indies was at once assured; and in remembrance of the event a fine statue of Rodney has been erected in Spanish Town, some few miles from Kingston.

In 1807, when slavery was abolished, there were more than three million slaves in Jamaica alone; and the disturbances caused by their sudden emancipation became so frequent that the old constitution of the island had to be swept away. Jamaica was then made into a Crown colony, with the power of the Governor much increased.

Its close connection with England through so many ties of colonisation and commerce made the earthquake sufficiently tragic for us, apart from the fact that at that very time a large party of English people were visiting the island, most of whom mercifully escaped injury.

The Chinese Awakening.

Our illustration this month shows us the "Chinese Giant" rousing himself from sleep and shaking the nations of the world off his "Land of Counterpane." One of the many curious points about the Chinese nation is the contrast between the vastness of its size and

[*Illustrated London News.*]

THE CHINESE GIANT ROUSES HIMSELF AND SHAKES OTHER NATIONS OFF THE COUNTERPANE OF THE WORLD.
(A French Artist's Idea.)

population, and the inertia and unprogressive nature of its methods of government and education. The striking contrast it bears to its neighbour Japan in this respect makes us inclined to conclude that the progress of a nation is generally in inverse proportion to its size.

A glance at the picture gives us a good idea of the extent to which other nations have taken advantage of China's long sleep to encroach upon her territories. There is Russia, with his knout and his bottle of "vodka," coming hotfoot across Siberia in his effort to wring rights of railroad from the sleeping giant. There is India, under the figure of a British officer, stretching out a long arm in the same direction; for between 1803 and 1907 the boundaries of the British territory have crept from British Burma to the eastern half of Indo-China, where the figure of a woman, the type of the French republic, proudly sits. On the borders of the Yellow Sea the German Emperor struts across the district covered by the treaty port of Kiao Chau, and Japan is planting her national flag upon Korea. Little by little these provinces have been gained, either by concessions or by conquest, and still China has slept unmoved. But quite lately there has sprung up a party which may be called "Young China," and which, like "Young Ireland" in 1840, is struggling for reform and progress, and among their party cries "China for the Chinese" plays a prominent part.

On January 9 two commissioners from Manchuria—Prince Tsai Chen and Hsu Shih-Chang—presented to the Emperor proposals for recalling the railway, mining, and other privileges given to Russia and Japan, as well as for the development of national commerce and industry. But "Old China" looks with sleepy disfavour at this vigorous shaking of the "Land of Counterpane," and prefers to put her foot down heavily on the party of reform.

Meantime, however, there is a rumour that Prince Fushimi, one of the leaders of the "Young China" movement, is coming to England to learn what progress really means. Moreover, the fact that on January 26 Russia gave orders for the immediate evacuation of Northern Manchuria is significant of what may happen if the Chinese Giant ever really awakes.

The late Shah of Persia.

The affairs of Persia during the reign of the late Shah, though somewhat remote from us, are by no means unconnected with English history. The death of Muzaffer-ed-Din reminds us of the fact that he was the last of the absolute monarchs of ancient Iran, of whom Darius Hydaspes, in the sixth century B.C., was the first.

When the late Shah was crowned the fortunes of Persia were at their lowest ebb. The country lay, as has been well said, "between the hammer of Russia and the anvil of Great Britain." No respect was paid to life or property, and disorder ruled in the land. The people, once such notable warriors that all the nations of the Eastern world fell prostrate before them, had become enervated, listless, and idle. The best thing that could be said of their ruler was that he was good-natured, fond of gardening, and so moderate in food that he seldom ate more than three courses out of the twelve he caused to be served up! But he had no idea of the value of money, and so, when his treasury was exhausted, he had to look abroad for more.

Great Britain was approached, but warily refused unless the guarantee of complete control over the Persian customs duties was granted. Then Russia stepped hastily forward, and, in return for huge political and commercial concessions, made a very large loan. Naturally the influence and trade of Russia in Persia from that moment was supreme. She paid, for instance, such small dues on carpets that the Indian trade in these commodities was almost ruined. She annexed all Northern Persia, besides controlling railways and customs, and Britain looked on in disgusted silence till she began preparations for penetrating Seistan and advancing on the borders of India. Then the British lion gave an angry growl, and for a time no one quite knew what would happen next. Quite recently, however, a peaceful settlement of the question has been arranged on the understanding that no further advances are to be made. But meantime Persia had gone to the wall, and such discontent was at length aroused that something like open rebellion broke out, and was only quelled by the proclamation of the Shah in September last

that henceforth the country should be ruled by a constitutional government, the first Parliament of which he opened in person soon ofter. Meantime Britain and Russia between them are still keeping a wary eye upon Persian affairs; but the new Shah was crowned and an heir-apparent appointed without a murmur of dissent, and the message of our King Edward wishing the Shah a long and prosperous reign shows every likelihood of being fulfilled.

MODERN INVENTION.

BY ARCHIBALD WILLIAMS,
Author of "How it Works," etc.

The Principles of the Flying-Machine.

(*Continued.*)

IN order to understand how the air is able to exert a lifting force on a surface driven obliquely through it, we ought to have some acquaintance with the physical theorem known as the parallelogram of forces.

Two people, A and B, pull with ropes on the top of a post P (Fig. 1). A's pull is one of 100 lbs., B's one of

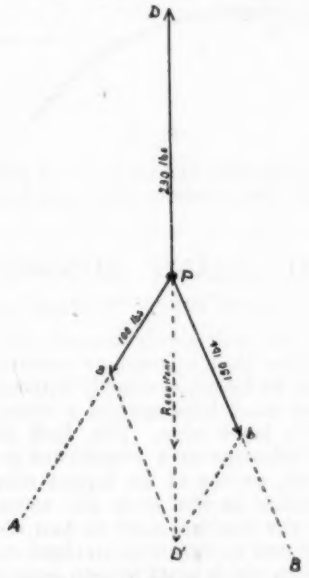


FIG. 1.

150 lbs.; and the directions of the two pulls, though on the same side of the post, lie at an angle to each other. What is the amount and the direction of the resistance offered by P to the united pulls of A and B?

On the rope PA we mark off a part P*a* of 100 inches, and on rope PB a part P*b* 150 inches. From *a* is drawn a line *a*D′ parallel to P*b*, and from *b* a line *b*D′ parallel to P*a*, meeting *a*D′ in D′. The line PD′ represents the *resultant* of the pulls A and B. That is, if a single person were substituted for A and B, and pulled with a force proportionate to the length of the line PD′ in the direction PD′, the effect would be the same. On measuring off PD′ with dividers, it proves to be 230 inches long. Produce D′P to D, making PD = D′P. Then the force (230 lbs.) represented by PD will exactly counterbalance the forces A and B, and all three forces be *in equilibrium*. So that, if the post were sawn through at the bottom, the top would not move in any direction.

THE KITE.

A practical illustration of such equilibrium is afforded by the kite (Fig. 2). Three forces act on it—(1) the pull

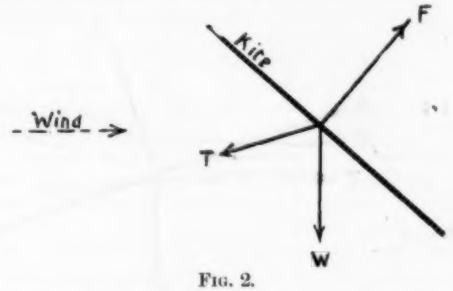


FIG. 2.

of gravity, W (= weight); (2) the pressure of the wind, F; and (3) the tension or pull of the string, T. The kite ascends until the inclination of its surface to the wind is such that the three forces balance one another.

THE ACTION OF WIND ON OBLIQUE SURFACES.

We next notice the extent and direction of the force exerted by the wind on an oblique surface. In Fig. 3 an arrow shows the direction of the wind, and AB is the oblique surface. If AB were "square" to the wind, as in the position A′B′, its resistance would obviously be greater. The greater the obliquity of the surface, the smaller is the pressure of the wind on it. Furthermore, the *direction* of the pressure is changed. Let us suppose the pressure on A′B′ to be 100 lbs. From a point O draw a line O*f*, 100 units in length, in the direction of the wind, perpendicular to A′B′. From O draw OC perpendicular to AB, and from *f* let fall a perpendicular *f*F on OC. Then the pressure on AB is to 100 lbs. as

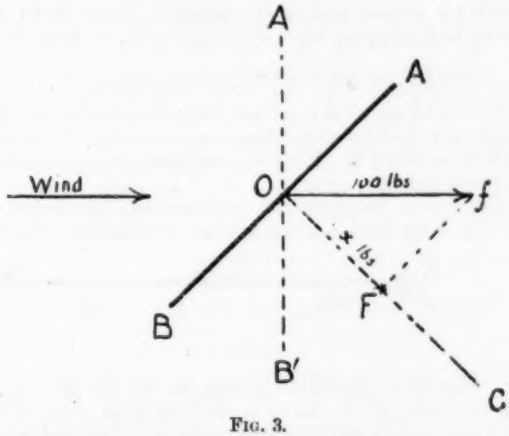


FIG. 3.

OF is to O*f*, and the direction of the pressure is along the line OC.

THE AEROPLANE.

In Fig. 4 we have the vane AB of an aeroplane, to which is attached an engine E driving a screw Y through the shaft XY.

Let us assume that a strong headwind is blowing, and that the screw is exerting just enough thrust to hold the aeroplane stationary in the air. The forces acting on the aeroplane are the same as those influencing the kite in Fig. 2, the *pull* T of the string being here replaced by the *push* of the engine.

Suddenly there is a lull in the wind. The aeroplane shoots forward, since the screw's thrust will propel the aeroplane at the speed required to make the air-pressure on the vane what it was before. The machine is now

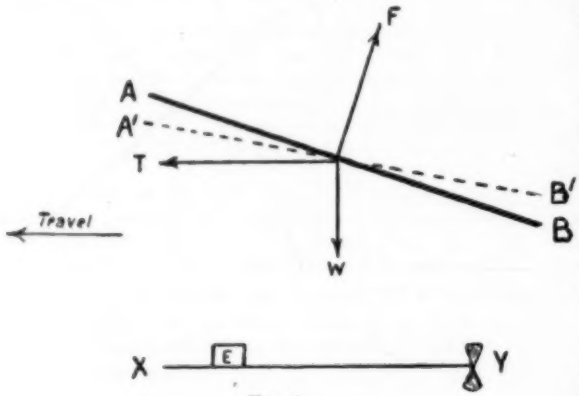


Fig. 4.

able to "keep up" only by *moving*. The same thing occurs when a boy runs with his kite to prevent it descending when the wind falls, his muscular power representing the aeroplane's screw-thrust.

We may now carry the matter further. The wind blows strongly as at first, but our aeronaut wishes to progress. How can he manage it? He must destroy the equilibrium of forces by increasing T. But this would also increase F, if the obliquity of AB were not altered, and the aeroplane would ascend as well as advance. By altering the trim of the machine he brings AB more nearly parallel to the earth, to the position A′B′, so that it strikes the air more obliquely. If, however, he wishes to ascend, he diminishes the obliquity, causing a greater part of the engine's power to be devoted to developing force F in opposition to force W.

The Shape of the Sustaining Surfaces.

The word aero*plane* is not truly descriptive, as the vanes now used by experimenters have a curved section, as in Figs. 6 and 7. The term aero*curve* would therefore be more logical.

The reason for curvation is shown in Figs. 5 and 6. In Fig. 5 we have a plane surface moving through the

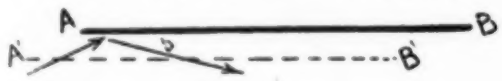


Fig. 5.

air. The forward end A deflects the air downwards in the direction of the arrow *b*, robbing it of some of its power to sustain the rearward parts of the surface when they strike it on reaching the position A′B′. But if for the plane be substituted a curved surface, as in Fig. 6, the change of direction of the impinging air is

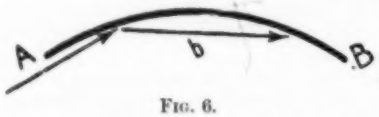


Fig. 6.

compensated by the diminishing obliquity of the surface towards the rear.

The Dutch have for many years used canvas sails on their windmills in preference to the flat wooden strips often seen on English mills, as the "belly" of the sails makes the wind-pressure more effective, for the reason just explained. The American windmill used on country properties to pump water has curved vanes, if of recent date.

The Negative Angle.

One more point. It has been found by experiment that it is advisable to turn the forward edge of an aeroplane's vane slightly *downwards*. We noticed in the previous chapter that the pressure on the forward end of a moving surface increases with the speed more than does that on the rear, and so the rear tends to drop. By giving the forward end a negative, or downward, twist N, relatively to the horizontal (as Nature has done in the bird's wing), this tendency is counteracted (Fig. 7).

Santos Dumont's Machine.

We may conclude with some figures about M. Santos Dumont's aeroplane. Total weight, with passenger, 465 lbs.; sustaining area of vanes, 861 square feet. The engine, of fifty horse-power, weighed 140 lbs. At a speed

Fig. 7.

of thirty miles an hour the lift (= F of Fig. 4) was 1·4 lbs. per square foot, or about 16,000 lbs. in all.

THE GIANT SUNSPOT.

ONE HUNDRED AND FORTY THOUSAND MILES LONG.

As the red sun sank slowly towards its setting last evening, and the thick atmosphere veiled it sufficiently to enable it to be looked at directly without discomfort, many persons must have noticed a conspicuous dark mark near its lower edge. This dark mark showed itself in the telescope as a magnificent group of sunspots — in fact, as one of the largest ever seen upon the sun. Earlier in the week this same group had appeared to the unaided sight as two distinct spots, for the group was at that time arranged mostly in two distinct clusters, which could be seen separately without optical assistance. Now the group forms a more nearly continuous stream, composed of a great number of considerable spots, and of their smaller dependants. In length the group extends for 140,000 miles, while its greatest breadth is 90,000 miles. It thus exceeds in its extreme measurements even the great group of February 1905, but it does not actually cover as large an area, as it is not so closely compacted, and tapers off, as to its breadth, towards the rear. It will probably be last seen by the naked eye to-morrow, but no doubt some part of the group will be visible in the telescope on Monday next. It is curious that four of the very largest spots observed on the sun during the last fifteen years have made their appearance during the month of February. The years 1892, 1894, 1905, and 1907 have all been distinguished by exceptional outbursts of this kind, outbursts which in each case have been in the southern hemisphere of the sun.—*Daily Graphic, February* 15.

A SCHOOL VISIT TO CAMBRIDGE.

BY JOHN N. DOWNES, HORNSEY HIGHER ELEMENTARY SCHOOL.

(*Illustrated from photographs taken by F. Jarratt and P. Savidge.*)

1. *The Objects of the Journey.*

THE practice of taking school journeys has been set down by teachers and scholars as a *sine qud non* in the curriculum of the Hornsey Higher Elementary School, and the whole-day journey taken in the autumn by each "year" of scholars is looked forward to with the keenest interest by all.

Not only is the journey of great educational value from the point of view of acquisition of knowledge, but it develops that social education which is apt to be overlooked in these days of wide curricula. Teachers and scholars are drawn more closely together, and the fullest opportunities are given to make the children good travellers in the best sense of the term—to inculcate the spirit of reverence, to promote interest, and to implant a healthy feeling of gratitude to all who labour for them directly or indirectly. For these ends the school journey is peculiarly valuable, and none will deny that they are worthy of attention and cultivation.

To obtain the maximum of good it is necessary that children should visit some place in close connection with their history, geography, and literature schemes of study. For this purpose the scholars of our "First Year" annually visit St. Albans, those of the "Second Year" spend the day in Winchester, and it was decided that the "Third Year" could most profitably give their earnest attention to the "haunted holy ground" of the ancient and historical city of Cambridge. Due notice was therefore given to the scholars, in order that they might inform their parents, obtain the necessary permission, and, at the same time, the promise to provide the cost of the excursion—four shillings being given as the extreme limit. It might be noted in passing how readily the parents co-operate with us on these occasions, thus giving a striking evidence of their idea of the value of these undertakings.

2. *Preparatory Arrangements.*

Active preparations were now begun. The day for the journey was fixed, and negotiations were opened with the Great Northern Railway Company through their chief passenger agent at King's Cross. It was finally agreed that the party could travel at the rate of 2s. 3½d. return for a child and 4s. 7d. return for each adult. All were to travel from Finsbury Park by the 9.6 a.m. train to Cambridge, in reserved carriages, and special tickets were printed, "on sale or return," available from the neighbouring local stations of Hornsey, Harringay, and Crouch End. The chief passenger agent also kindly sent down, on request, five dozen folding plans of Cambridge.

The children take their lunch with them on these journeys, but arrangements are always made to have tea together in some convenient room. Application was therefore made to Cambridge caterers, and one firm agreed to provide tea at the rate of 7d. per head; but there was a possibility of being able to have tea in Trinity College, and the kitchen department finally offered to provide tea at the rate of 9d. per head in two relays, or 10d. per head if in one group only. On the question being put to the children, it was unanimously agreed to have tea in Trinity at 9d. per head.

It was thought that scholars should take a more particular interest in the Leys School, King's College, Trinity College, and St. John's College. Accordingly letters were written to the headmaster of Leys (Dr. Barber) and to the masters of the three colleges, giving the object of the school journey, particulars as to the party and what it desired to see, and, finally, requesting permission to visit. Courteous answers, giving the desired permission, were received in each case.

To prepare the scholars during the week before the visit, history lessons were devoted to Cambridge, illustrated, where necessary, by diagrams. Secondly, special guides were cyclostyled for each traveller. The guides consisted of twelve pages, stitched in book form, 6¾" by 4¼", and contained (1) historical notes on Cambridge and the university, (2) plan of railway route, (3) full double-page plan of Cambridge in centre, (4) itinerary.

The historical notes ranged from the Roman encampment at Camboritum to the time of Cromwell, and the life of the university from its foundation in 1209.

On the afternoon before the day fixed for the visit a special lantern lecture, illustrated by slides of all objects of interest, was given to the whole party. The slides, obtained from Messrs. Tyler and Co., 48 Waterloo Road, S.E., were shown in the order in which the buildings would be seen the next day. Therefore each child was quite prepared as regards "what to note" *en route*. The railway tickets were distributed, and scholars were advised to be on the railway station departure platform a quarter of an hour before the train was due to start. The cost for each child worked out as follows:—

	s.	*d.*
Railway fare	2	3½
Tea.....		9
Other expenses—for example, "Tips" ...		1½
Total.....	3	2

3. *First Impressions.*

The morning of the following day opened dull, but promised to be fine—a promise which was well fulfilled. Eighty-one children and eight adults were all assembled on No. 5 Platform, Finsbury Park, before 9 a.m. We quickly entrained, and were soon bowling along northwards through country which looked green and beautiful under autumn's mantle. Special interest was given, in the moment or two at our disposal, to Letchworth, the "Garden City," on our way.

Cambridge was reached at about 10.40 a.m., and when the whole party had mustered outside the station we proceeded in small groups down the Station Road and Hill's Road to the Perse Grammar School for Boys and the Roman Catholic Church of "Our Lady and the English Martyrs." The Perse boys were about to enter the school chapel for service, and all our scholars were much interested in the arrival of the boys at the "double" under prefects in charge of each squad. The fine buildings of the church just opposite now arrested our attention for a few moments; but here eleven o'clock struck, and as we were due at Leys, we had to forgo our visit to the university cricket ground and proceed straight to the former.

4. *The Leys School.*

Our visit to the Leys School was most interesting to all. We were conducted first through the new chapel, just nearing completion, and thence to the big schoolroom where the boys do evening preparation. Due respect was paid to the Honours Boards, after which

we passed out and visited some of the empty class-rooms, the dining-hall, the laboratories, and the swimming-bath. This last is larger than our own, and many of our swimming champions would have liked to disport themselves in the element which is fast becoming

KING'S COLLEGE CHAPEL.

congenial to the majority. From here we passed on to the dormitories, which gave rise to numerous questions, and afforded opportunity for giving information on the life of a public-schoolboy. Many were surprised to hear that, as in all public schools, some boys stay on till the age of twenty or twenty-one, and we heard many expressions of desire to be able to come to a school of this kind. I think visions of possible pillow fights loomed largely in the imagination of some beholders.

On the school playing-fields battles of a sterner kind could be talked about, and the fives-courts, Rugby football ground, and the honours lists in the pavilion all received due admiration. For my own part, my schooldays as a boy at Tonbridge School came vividly before me again, and I tried to make the boys realise them.

5. *King's College Chapel.*

We now proceeded up Trumpington Street, passing *en route* besquared and begowned undergraduates, grave and gay, many with huge tomes and notebooks under their arms. Our objective was King's College; but we noted on our way in turn Addenbrooke's Hospital, the fine exterior of the Fitzwilliam Museum, Cambridge's oldest college of Peterhouse, Pembroke, the Pitt Press, and the colleges of St. Catherine's and Corpus Christi. Notes were given on all these in the guides before-mentioned, and the scholars perused them as they passed along.

Arrived at King's, we went straight across the quad to the chapel, noting the exterior carefully. We then entered, passed through the great screen, and seated ourselves in the stalls beyond. Here the provost (Dr. James) gave us a simple but clear explanation of the main beauties of the chapel. He first drew our attention to the wonderful roof of fan-vaults, then to the marvellous windows. King's Chapel is a chapel of windows, and all the glass is original. For some reason the soldiery of Oliver Cromwell spared the stained glass here, which is all of the Renaissance period. Dr. James pointed out to us that a connected exposition of gospel history was here before us, culminating in the famous end window.

The woodwork of the stalls and the screen, beautifully carved by Italians in Henry the Eighth's reign, were next admired. The organ (1688) surmounts the screen, on which some of us were able to make out the love-knot and twisted initials of Henry the Eighth and Anne Boleyn. The lectern, of early sixteenth century work, with its statuette of Henry the Seventh, was examined, and Dr. James now bade us good-bye. We spent some ten more minutes in scrutinising the thousand and one beauties of this splendid relic of the days of old. We noted the Tudor emblazonments so lavishly bestowed, the portcullis of the house of Beaufort, the Tudor dragons, the greyhounds of Henry the Seventh, and the antelopes of Henry the Sixth. The panelling at the altar is imitation, but is to be thoroughly worked out in Gothic style shortly. Founded in 1441, the College Chapel was commenced in 1446, Henry the Sixth himself laying the foundation stone. Of the structure it can be truly said that "no building raised in Europe after 1500 is so pure a specimen of Gothic as this." It is a lasting monument to the Tudors, and we were loath to leave its restful charm.

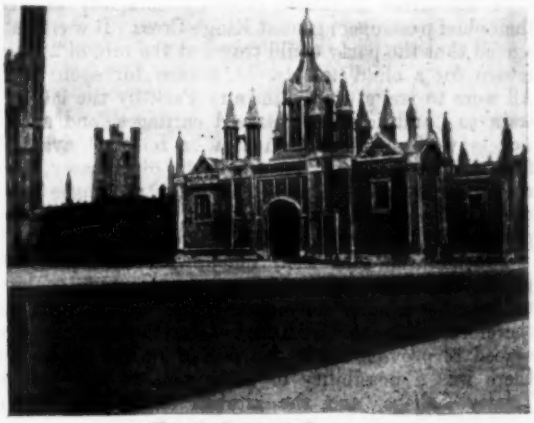
6. *The Luncheon Hour.*

By the time we were all out of the chapel, dinner packages were being eyed wistfully, and we therefore wended our way over the river by the bridge into the famous Backs. No one who has seen it can forget the impression made by King's Chapel viewed from here.

A meadow was discovered containing two long, kindly tree-trunks, and on these all were quickly seated, devouring all sorts and conditions of sandwiches and other esculent solids. Here an hour rapidly passed, and then the whole group was photographed.

7. *St. John's College.*

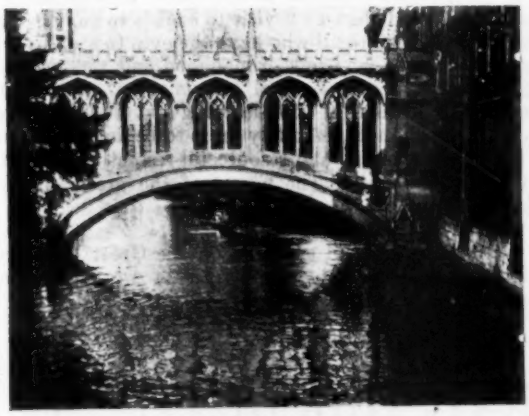
Our next objective was St. John's College, and *en route* we passed the Senate House and the Gate of Honour,



KING'S COLLEGE GATEWAY.

through which innumerable students have passed on their way to receive their degree. St. John's was founded

by Lady Margaret Beaufort, grandmother of Henry the Eighth, in 1509. We noted the arms of Lady Margaret above the doorway of the main gate, and also the now familiar Tudor rose and Beaufort portcullis.



THE BRIDGE OF SIGHS.

Inside the chapel our guide called attention to the paintings on the roof, the flooring of British marbles, the altar of Belgian marble, and the fine silver cross. The altar tomb of Hugh Ashton, Archdeacon of York (died 1522), is an interesting relic, and shows the curious rebus—an ash growing out of a tun.

From here we proceeded to the library, where all were much interested in the ancient books and manuscripts so beautifully illuminated by the monks of old. The vellum copy of Cranmer's Great Bible is specially noteworthy.

Next we passed through the famous Bridge of Sighs, and viewed the exterior also from the other open bridge a little farther down the river.

8. *Trinity College.*

We now directed our steps to the foremost college in Cambridge, temporary home of some seven hundred undergraduates—Trinity. Passing through the great gate, we noted the statue of the founder of the college, Henry the Eighth, who in 1546 joined and endowed nine houses on the site. Passing through the great court, we entered the chapel, and viewed the statues of Macaulay, Bacon, and of Newton in the place of honour, as is fitting for Trinity's greatest son, who, "with his prism and silent face," truly gave expression to the idea of one who was "voyaging through strange seas of thought alone."

The impressive dark oak panelling, the highly-decorated walls and roof, and the carved door to the organ loft were seen; and now we passed out, noticing that fine piece of English Renaissance work—Neville's fountain (1602)—in the court. Trinity owes a great debt to Thomas Neville, its master from 1593 to 1615.

We next visited the library, built by Sir Christopher Wren (1676), and saw the Roman altars at the bottom of the staircase leading thereto. The library itself was full of interest. Byron's statue (rejected by Westminster Abbey), where Byron is seen meditating on Childe Harold, immediately takes the eye. But there are also instruments of Newton's, a Papal Indulgence, and fine cases of Roman and Greek coins to be examined. But time passes, and we are soon crossing the quad to the entrance to the Hall, from whence we can see, on the library roof opposite, the four statues to learned nymphs. Entering the dining-hall, we turned our attention to the portraits of Trinity's famous sons—Newton, Bacon, Dryden, Tennyson, Thackeray. The hall is excellently appointed, and we were glad to be able to take away impressions of it, as well as of the minstrel's gallery outside it.

9. *The Round Church.*

By this time it was four o'clock, and as tea was fixed for 4.30, it was decided to pay a visit to the Round Church of the Holy Sepulchre, and then return immediately to Trinity. We therefore passed out of the dining-hall, through the tiny old door, and so out into the quad again, through the old cloisters, where, if walls could speak, they could tell of great men, of great work done under their kindly shelter, and fill our ears with the story of the written and unwritten history of these three last centuries.

Now we pass along the bank of the Cam, scene of many aquatic triumphs, of many an historic "bump," and so round to the end of St. John's Street, where we arrived at the oldest of the four round churches in our country. It was founded by the Knights Templar, and is said to have been consecrated in 1101. Small as the church is, its effect is extremely impressive to the beholder, and the semi-darkness adds to its grandeur and solemnity.

10. *Refreshment and Return.*

Four-thirty had now come, and we adjourned, the prospect of tea spurring on jaded young limbs, once more to Trinity, where we sat down in two relays to tea, and dissipated our weariness in the cup that cheers, and fortified our bodies with bread and butter, watercress, and cakes. The first pangs of hunger and thirst being assuaged, we were able to admire the college tea-service, the suave waiters, and the excellent appointments of the dining-room.

TRINITY COLLEGE GATEWAY.

"*Pransi, tria millia repimus*," sang Horace. We were fully able to exemplify this afterwards, for it only remained to wend our way stationwards through the lighted streets, *via* Market Place, Petty Cury, St. Andrew's Street, Regent's Street, and Hill's Road.

There is plenty of time, as the train does not start till 6.30, and so we—the first batch—*repimus*, leaving the second relay doing strong battle against fresh mounds of bread well spread and tea well brewed, till urns were dry and loaves were non-existent.

Regretfully we leave this home of learning, this old university town, with its store of treasures, its grand past, its strenuous present, and its glorious future, where the fortunate young man may spend such years as he will never again spend in his little span of life; where he may gain health for body and mind, and thus equip himself, so that on leaving he may occupy a position in which he will do honour to himself, his university, and his country.

We wonder, as we leave, whether any of these young people whom we take away will one day return as *alumni*. We sincerely hope that it may be so. In how many hearts has the seed of this endeavour been implanted? If only in two or three, our visit has surely been "worth while." That the indefinable spirit and tone of the place has had its effect we know; that certain abstract knowledge has become concrete we know too. The "education complete at fourteen" idea cannot be better exploded than by a visit to such a town. It has been a revelation to all who have the eyes to see. Boys and girls on the far brink of manhood and womanhood have seen that this natural outcome does not mean emancipation from all book-learning and study. There is more, much more, infinitely more to be done by those who have the energy and resourceful resolution to do it. Is it worth doing? The names of the great sons of Cambridge supply the answer.

* * * * *

At 6.30 we had all gathered on the Great Northern platform, and then by express train we once more dashed southwards to Hornsey.

Educational Experiment.

THE TEACHING OF READING AND ARITHMETIC.

BY MARSHALL JACKMAN,
Former President of the National Union of Teachers.

A FRIEND, intending to be facetious, described my experiments by saying, "Jackman teaches arithmetic by teaching reading." He was not so very far from the truth. Much valuable time in the school-life of children of seven or eight is often now wasted in trying to teach them with great trouble what, at the age of ten or eleven, they would grasp easily, with less labour on the part of the teacher and less expenditure of their own time. This specially applies to arithmetic as now generally taught, and to formal grammar as it was generally taught in years gone by. I came to the conclusion that much of the time now spent on arithmetic in the lower standards is wasted, and might be given with advantage to reading or to some other more suitable subject.

The reasoning or logical faculties of young children are not sufficiently developed for them to understand the principles underlying arithmetical processes as taught in schools working on ordinary Code lines. The development of these faculties should be natural and gradual, and any undue or excessive forcing will lead to serious harm. In their development only such propositions should be considered as the pupils can fully grasp, and the problems should be of such a nature that the conclusions can be readily realised.

Children when pressed beyond their capacity often fall back upon

THE IMITATIVE FACULTY.

The processes are memorised, and ability to recollect and reproduce a method have too often been mistaken for intelligence, especially where securing examination results, and not education, is the chief aim. Under such conditions arithmetic loses its chief value—its value as a means for training the logical faculties. On the other hand, the faculties of observation and language may be developed more rapidly and to a much greater extent than is usual in the lower classes of elementary schools.

With greater opportunity for observation, with larger practice in expression, and a consequent fuller and more exact vocabulary, the logical faculties may be developed naturally, and their development would follow, not precede, facility of expression. Principles underlying what to a young child are complex processes will be more easily comprehended at a later age. With less time spent on arithmetic in the three lower standards, and the usual time spent in the fourth and fifth standards, I have proved that the knowledge of arithmetic is as extensive and far safer than with the ordinary method of teaching, which involved a greater expenditure of time in most of the standards.

I carried out my experiments by withdrawing the teaching of all but the simplest arithmetical processes from the curriculum of the classes below Standard IV. In these classes my syllabus is confined to mental work, and

NO COMPLEX PROCESSES ARE TAUGHT.

Simple questions are answered orally or on paper. All problems set are within the grasp of the children. These problems are not confined to the four simple rules; they include problems in fractions as well as in practice and proportion. The children are given a thorough knowledge of number; they are taught to read and write the expressions of quantities in various denominations, including money and weights and measures. They are taught to change quantities from one denomination to another, and in the end to acquire an intelligent skill in the application of the ordinary tables. The child, when attempting the more complex processes of arithmetic later on, commences its task with an adequate knowledge of notation and numeration, and with the power to change quantities from one denomination to another, so that the only difficulty presented by any problem is that connected with the simplest form of the actual process or processes involved.

In the fourth standard the children take the first written work, as distinguished from merely writing answers to simple problems. By this time the children should have memorised all the tables—weights, measures, money, and abstract numbers. They should have been trained to change mentally quantities from one denomination to

another, and have a thorough knowledge of numeration and notation. With the children thus equipped, we commence the teaching of the ordinary processes by sums similar to the following :—

1. If we gave 4 lbs. 9 oz. of sugar to each of three boys, what would they get altogether ?

2. If we gave 4s. 9d. to each of three boys, how much would they get altogether ?

3. If we gave 49 marbles to each of three boys, how many would they get altogether ?

These sums are set out side by side, thus :—

lbs.	*oz.*	*s.*	*d.*	*t.*	*u.*
4	9	4	9	4	9
	3		3		3

The first worked is the one in pounds and ounces, then the one in money, and last the one in ordinary numbers. By reference and by comparison the process of changing units or ones into tens is more easily understood. The reason for taking weights before money or abstract quantities is that the value of twenty-seven ounces in pounds is not so readily seen as the value of twenty-seven pence in shillings or twenty-seven ones in tens. The two latter have been more memorised in the tables. For children, memorising is easier than reasoning. The scholar is compelled to see that the changing of the ounces into pounds is a definite step, and one which he is bound to reason out. In changing pence to shillings or ones to tens he may not reason it out. He can see without any reasoning that 27 = 2 tens + 7 ones. He may at one time have been taught to reason this out, but after a while he falls back on his memory. He is also familiar with money, and almost as easily sees that 27 pence = 2 shillings + 3 pence as he sees that two tens and seven ones are twenty-seven. Having worked these three sums by multiplication, they are then set out in the following form and worked by addition :—

lbs.	*oz.*	*s.*	*d.*	*t.*	*u.*
3	7	3	7	3	7 marbles.
3	7	3	7	3	7 marbles.
3	7	3	7	3	7 marbles.

In this way in the first lesson the processes for addition and multiplication of weights, money, and ordinary numbers are taught, and by experience it has been found that this was possible, and that the task presented no difficulty.

Subtraction is taught in a similar way, using such sums as the following in problematic form :—

lbs.	*oz.*	*s.*	*d.*	*t.*	*u.*
4	8	4	8	4	8 marbles.
2	9	2	9	2	9 marbles.

Subtraction was really taught almost incidentally. Numbers and quantities were multiplied by five, and then by six or by seven, and then eight. The difference between the two products was found to equal the multiplicand, or the difference between one multiplicand and the product was shown to be equal to the product of the same multiplicand by the lower number. The children worked these sums to prove their answers. The difficulty of subtraction seemed to vanish.

Short division at first was also taken in the triplicate form. The following sums in problematic form are samples of the kind taken :—

Weeks	*Days.*	*s.*	*d.*	*t.*	*u.*
4) 7	5	4) 7	5	4) 7	5

The idea of working the sums in this triplicate form was in order to impress on the children's minds that there was no difference in principle whether weights, measures, money, or ordinary numbers were used.

Reduction of weights and measures and money was taken in Standard IV., but long division was not taken before Standard V. I found by experience that this rule could be mastered in three weeks in Standard V. The syllabus for arithmetic in Standard V. and upwards is the ordinary Scheme B, with long division specially provided for at the commencement of Standard V.

The time given to arithmetic in the three lower standards is the first fifteen minutes allotted to secular work in each session, except on one afternoon per week, when the time of the lesson is extended to thirty minutes, and notation and numeration of all denominations already known are taken. It will be noticed that the

MENTAL ARITHMETIC LESSONS ARE SHORT.

—in fact, about as long as a sensible teacher would devote to mental work when taking the ordinary Code arithmetic. This disposes of the criticism levelled at the experiment by some that, by having mental work only, a great strain is thrown on the teacher. In the mental arithmetic lessons our answers are not always oral, neither are the questions. It is a regular practice to have a certain number of lessons during each week in which the answers are written. The questions, too, are sometimes written. This practice of written questions and written answers is increased as the work progresses. Thus the children who are weak in calculation are constantly discovered, and special care taken to remedy the defect. The total time given to arithmetic in the three lower standards is one hundred and sixty-five minutes per week, a saving of eighty-five minutes per week in the time allotted under the old system. In Standard IV. the normal time is allotted to arithmetic, but in the upper standards the time has been reduced by one lesson of forty-five minutes per week. Having saved eighty-five minutes per week from arithmetic in the three lower standards, I had to decide what could best be done with them. I decided to increase the time allotted to reading. I provided for a reading lesson in every session. I also adopted a special classification for reading in the three lower standards. In these standards I took the reading lessons concurrently, and classified the children, irrespective of standards, into three groups. Group 1 consisted of children who reached a standard represented by nine or ten marks. They were children who could read well, and had mastered the mechanical difficulties. This group was increased from time to time as children in the next lower group reached the standard for reading I had fixed. Group 2 consisted of children whose standard for reading was represented by five to eight marks; while Group 3 consisted of children who failed to get five marks for reading. During the year Group 1 increased, while Groups 2 and 3 decreased. In this way the masters who took the lower groups were able to concentrate their attention on the weaker readers without any neglect of the better readers. In the highest group, where all the mechanical difficulties had been mastered, special care was taken to create a love for reading. With more time for reading more reading books were required. I decided that no book should be read more than once in class during the year. By getting the education authority to supply me with

more than the regulation sets of readers, and by borrowing books from the infants' and girls' departments, I was enabled to keep the reading going without having to read a book through in class a second time. As a rule

I USED CONTINUOUS READERS.

An endeavour was made to interest the children in the story, and as far as I could, when a book had been read through in class, the children were allowed to take it home to read it through again privately. Silent reading is practised largely in the first division, and with some success. It is also practised to a certain extent in the second division. I varied the books, letting a difficult book be followed by a very easy book. I found the children revelled in the delight they experienced in finding they had the power to read fluently and with ease. For example, after reading such a book as *The North-West Passage*, an infant's primer was taken, borrowed from the infants' department, such as *Cinderella* or *The Sleeping Beauty*.

The following is a list of continuous readers taken in Standards I., II., and III. last year—these, in addition to some four or five ordinary readers :—

Dick and His Cat, Cinderella, Sleeping Beauty, Elsie at the Farm, The White Cat, Four Playmates, Grannie's Coach and Four, Black Beauty, Boys and Girls of Other Days, Pullabad, At Duty's Call, and *The North-West Passage*.

THE TEACHING OF LATIN.

AN interesting schoolbook has lately been issued by Messrs. Longmans, under the editorship of Mr. P. A. Barnett. It is a reprint of Goffeaux's *Story of Robinson Crusoe in Latin*, and its appearance raises once more the question of Latin texts for juniors which will combine human interest with linguistic value. It is really an old question which is of constant recurrence, and Mr. Barnett, in his "Epistle Dedicatory and Explanatory," deals with it in such a lucid and unconventional manner that we take the liberty of quoting. This epistle is addressed to Mr. Kipling :—

"The body, if not the soul, of this little book is due to the labours of an intelligent Frenchman, who discovered, sixty or seventy years ago, that the degenerate practice of introducing young people to the Latin language by means of Cæsar, Cicero, and Virgil failed to engage their interest. The fact has since been rediscovered by persons so eminent, and has been proclaimed with such energy and unaffected ingenuousness, that I do not mind confessing that I have myself long had something more than a suspicion of it.

"Goffeaux thought it worth while to write some of the adventures of Robinson Crusoe in Latin, in order that boys who already knew something of the original enchanting history might realise that it was possible to express in that language matters about which a reasonable being might reasonably be interested. His book had considerable vogue ; and after four or five editions had been printed in France, it was printed and reprinted in this country, with English notes.

"When a copy of Goffeaux's book came in my way, through the kind offices of a friend, I wondered whether it could have exhausted its usefulness in our grandfathers' time, whether our children might not get some profit out of it. My Frenchman has, in my hands, been cut down a good deal ; his Latin has been mended ; not less than half of his moral sentiments have been suppressed ; and the result is now offered to the boys and girls of England for what it is worth.

"You are in the direct line of great story-tellers, of whom Defoe was the greatest in his day ; and I have placed your name in front of my wares because I desire, above all things, to commend and make easier to young people the reading of Latin as literature. I do not call my Goffeaux by that sacred name ; but a healthy boy who is piqued into following Crusoe through a language which Cicero and Cæsar and Virgil (in spite of their imperfect education) would have understood, will the more readily believe that they themselves are better worth reading. And he will assuredly read them the more easily after reading Goffeaux.

"I might have begged—I dare say in vain—for the patronage of the professed scholar. I should like to have it ; but I am more concerned to secure yours, because, whereas Latin literature will not live as an interest of youth—or of old age, for that matter—by reason of its philological or rhetorical or scientific interest, it will live because people love it.

"It is unfortunate that Cæsar and Virgil and Cicero neglected to write Latin books for the use of English children. Yet, if we are to present such things in any form which young English people will willingly accept, we must temper the forbidding but necessary grammar that hedges round the great masterpieces of those great writers with something not quite so austere, at all events superficially. Such fine scholars as Professor Sonnenschein and Mr. Godley have, indeed, led the way—I do not know how people ever got on without *The New Orbilius* and *Ora Maritima*—and I plead that, after them, Goffeaux may have his chance.

"It is true that his style is not classical, nor could all the botching of an even learned editor make it so. It lacks periodic consecutiveness ; its constructions are mostly the simple, ordinary constructions ; it does not affect the delicate shades that make native Latin so subtle an instrument of logic and narrative. But for these very reasons it is better fitted for the purpose proposed. And, at any rate, it contains a large vocabulary (a few words, to be sure, invented), which the intelligent boy and girl can pick up as they go along. They can avoid the 'more flagrant forms of guessing,' against which an eminent friend of your own was solemnly warned, by an occasional use of the dictionary and a glance at the few appended notes."

Here, then, we have the case in a nutshell. As for the text, it is divided into twenty-five short chapters, and is beautifully printed. The book is of special interest to those schools whose pupils are to take a Latin course leading up to matriculation, and then to drop the subject, though not, we trust, the effect of its study, entirely.

CONAN DOYLE AS HISTORY TEACHER.

I HAVE just finished reading Sir Arthur Conan Doyle's new historical story *Sir Nigel*, and I want a middle form of "young barbarians" for the purpose of trying an experiment in the teaching of history.

The story has appeared in serial form in the *Strand Magazine*, so that some of them may know it. One might, however, hazard a guess that they do not know it is a historical story, and that their interest in the tale is purely human and personal. The fact that these pupils have got over the first excitement is all to the good for my experiment. Now for the *modus operandi*.

I would have each boy procure a copy of the novel. This means an expenditure of four and sixpence per head; but the money would be well spent. (Before long, no doubt, our novels will cost us less.) Moreover, when the book is done with as a schoolbook, it will be a joy for ever in some juvenile library; and this cannot be said of many schoolbooks, to put the matter mildly.

Each boy being provided with a copy, I should ask those who had not read the book to do so at once, out of school hours. There would be no pressure required. They would read it somewhat breathlessly, skipping the author's most conscientious work and revelling in the bravery of the narrative; and this would be just as it should be. Meanwhile I should prepare for the work by drawing up lists of historical events belonging to the period of which the story is told, and having these cyclostyled or copied in some way; also in producing

(Illustration to "Sir Nigel," reduced: Smith, Elder, & Co.)

maps of the Guildford district, in which the scene is laid, as well as plans of Calais; and in hunting up illustrations of the period—dress, armour, portraits, buildings, etc.—and making lantern slides from them.

Then we could return to the book, and use the interest in Sir Nigel and Lady Mary as a peg on which to hang a glowing coloured picture of the period immediately following the battle of Cressy—the time of Edward the Third and the Black Prince, of Sir John Chandos and Sir Walter Manny. I imagine that the history lesson would be the most enjoyable of the day.

Let not Dryasdust make a mock at me. The author of the story is no mere romancer, independent of time or probability. "There is no incident in the text," he writes, "for which very good warrant may not be given." And further, he adds, "For good or bad, many books have gone to the building of this one. I look round my study table, and I survey those which lie with me at the moment, before I happily disperse them for ever. I see La Croix's *Middle Ages*, Oman's *Art of War*, Rietstap's *Armorial Général*, De la Borderie's *Histoire de Bretagne*, Dame Berner's *Boke of St. Albans*, *The Brakelond Chronicle*, Hewitt's *Ancient Armour*, Coussan's *Heraldry*, Boutell's *Arms*, Browne's *Chaucer's England*, Cust's *Scenes of the Middle Ages*, Jusserand's *Wayfaring Life*, Ward's *Canterbury Pilgrims*, Cornish's *Chivalry*, Hastings's *British Archer*, Strutt's *Sports*, Froissart's *Chronicles*, Hargraves's *Archery*, Longmans' *Edward III.*, Wright's *Domestic Manners*. With these, and many others, I have lived for months." This is enough to satisfy the most exacting. It would, at all events, satisfy me.

I consider Conan Doyle to be specially good for such an experiment. He is not too long-winded. He is healthy in tone. He loves the open air and the sports of England—his description of a fine horse outdoes all the rhapsodies of a seventeenth century lover. His book contains no dialect, and, moreover, he respects the *King's English*.

Who will try his novel as a *text-book?*

FAR AND NEAR.

INTERESTING ITEMS, CHIEFLY FROM THE PERIODICALS.

THE editor of the *Reader* has been taking the opinion of certain eminent people on the matter of the attendance of children at the theatre. Sir Theodore Martin is doubtful, but looks forward to "a better time when a visit to the theatre will be a valuable element in the education of all, and especially of the young." Sir Edward Russell, "a keen playgoer," advises caution and careful selection. Helen Mathers strikes the right note when she says that "*Peter Pans* are rare." Father Bernard Vaughan says: "Talking in the abstract, I should say the fewer plays you take a child to the better for the child." The Earl of Meath halts a little between two opinions, but concludes with the pertinent remark: "They should, in my opinion, only be taken to the theatre when plays are being acted which have been specially written, or adapted, to meet the capacity of children." Forbes Robertson loves to see children in the audience, and makes a point of playing *up* to them. On the whole, more J. M. Barries are wanted. Let us hope that they are growing.

Children and the Theatre.

ACCORDING to Tolstoy, as every one now knows, Shakespeare is "a back number." It is curious how the opinion of the great critic jumps with that of many schoolboys and schoolgirls. The world now requires new dramatists, whose business it will be "to search for and work out a new form of modern drama." Let not all the pretenders speak at once. There are so many dramatists who can truthfully say that their work is, at all events, quite different in every respect from that of Shakespeare. The vogue of the Bard of Avon, says Tolstoy, has been "made in Germany." Goethe began it, and the rest has been a matter of hypnotism. "All Shakespeare's characters," we learn, "speak not their own but always one and the same Shakespearean pretentious and unnatural language, in which not only they could not speak, but in which no living man ever

Shakespeare in Schools.

has spoken, or could speak." This is not original. For generations examiners in English literature have held the same opinion, surely; for have they not insisted upon the paraphrase—that is, the rendering into every-day language—of such inflated passages as that which begins, "To gild refinèd gold, to paint the lily"? We hope that Tolstoy will now set us right about Milton and Miss Marie Corelli.

IN the January number of the *Treasury* Canon Barnett gives expression, incidentally, to a few *quasi* educational opinions. The people need, he thinks, "the teaching of enthusiastic morality." He wishes to bring the "university atmosphere" into the working-class sphere. We suggest a blending of atmospheres. "Elementary education ought to bring out character and individuality more than it does." It will do so when we have finally got rid of the shackles imposed by products of the "older universities." Married and responsible women ought to have the vote, as it would give them "a sense of independence and individuality." We innocently thought they already possessed it.

Canon Barnett on Education.

THE February *Windsor Magazine* contains no less than twenty-eight cartoons of authors, reprinted from *Vanity Fair*. All are interesting, but those of "Tom Brown," Matthew Arnold, Thomas Hardy, and Rudyard Kipling are specially so to teachers. Matthew Arnold, as here represented, might have been sketched asking that little girl to spell "cat"—the little one whom he assured, when the ordeal was over, that he could not have done it better himself; or he might be making that delicious "apology for being lively" which is given in the preface to one of his volumes of essays. Perhaps the best of the cartoons as portraits is that of Kipling, whose father, as many of us have forgotten, was headmaster of the Lahore School of Arts.

Cartoons of Authors.

Charwoman (mending carpet). "I never thought as 'ow I should come to this, mum. Me that was that well eddicated that afore I was married I couldn't even make a beef pudden!"

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"GORKI," says a writer in the *North American Review*, "is a self-educated man, but he is not of peasant origin, as is often stated. His paternal grandfather was a colonel in the army; but, deserted by his mother, and losing his father when he was only four years of age, Gorki was brought up by his maternal grandfather. In his early youth he followed various poor callings; but during all that time he was devoted to reading, and he read all the classical books he could lay hands on. By the time he was fifteen he had, in fact, conceived a wild desire to study, to know. He went to Kazan, imagining that there the sciences would be gratuitously imparted to those who desired knowledge; but finding this was not so, he entered a bakery. At nineteen, in despair, he attempted suicide, but, being rescued, he tried to earn a living by selling apples in the streets. Such was his preparation for his future career; and an eminently good preparation it was, for he not only saw all sorts and conditions of men, but had splendid opportunities of becoming acquainted with their sufferings and their needs."—*Review of Reviews.*

The Education of a Novelist.

IN the current *Contemporary*, Mr. A. E. Cave writes on a subject which closely concerns ourselves. He denounces the variously-priced "Bits" which cumber our bookstalls, and draws attention to the fact that the bookstalls of the States are laden with high-class magazines and new novels, while in Germany the traveller provides himself with a "reprint" before setting out on his journey. He says, however, that public taste in this matter is improving, "in spite of the industrious efforts of editors to the contrary." The matter ought to be looked at in a level-headed way. The large sale of the lighter journals, from *Punch* downwards, is a proof of the exacting nature of our modern life. But because a man buys *Punch* or *Tit-Bits*, he does not necessarily look to them for his daily mental pabulum. Most of our monthly illustrated magazines certainly compare unfavourably with such a production as the *Munsey*, but they are on the upgrade. As for classics—at all events the classics of fiction—we see them frequently upon our railway journeys now that they are issued in cloth covers and printed in good type at the same price as a magazine. We see nothing to lament over in the demand for good pictures. It is one of the most cheering signs of the times.

Public Taste in Literature.

ONE day Thackeray was found wandering rather sadly round the great reading-room of the British Museum, and was asked by a friend what he had lost. He was seeking information, he said, on George Washington, and when his friend volunteered certain helpful notes on bibliography, the novelist said, "Yes, yes, but will those books tell me what sort of breeches he wore?" Dress is indeed an important matter to the writer and to the teacher who is thinking of following the lead of

Clothes and the Man.

Miss Johnson of Sompting and making the whole of his work—even the arithmetic—dramatic. It is therefore comforting to know that several books have lately been added to the list of works on costume. If any one wishes, for example, to organise a tableau showing the Canterbury Pilgrims, he will find out how to dress his mummers from Mr. Dion Clayton Calthrop's volumes on *English Costume*, published by Messrs. A. and C. Black. Mr. G. W. Rhead, in his *Chats on Costume* (Unwin), has also collected a great deal of useful information of the same kind, and volunteers the interesting opinion that trousers, if not immortal, are at least destined to be coeval with mankind. This is somewhat pessimistic. Mrs. Aria's volume on *Costumes* (Macmillan) deals partly with fancy dress, and may also be found useful by educational stage managers.

SPEAKING of stage management recalls the dramatic and histrionic efforts of the natives of the Kentish village of Hildenborough, which have been witnessed and described by no less eminent a dramatic critic than Mr. William Archer. The play itself is home grown, and is described as "an entirely simple, sensible, human piece of work." It is entitled *Back to the Land*, and the villain is a German Jew who has learnt the Hildenborough secret—how to make cricket balls—and proposes to set up a factory with German workers and undersell the native craftsmen. This conception is certainly a stroke of genius, bringing the drama home to the minds of the local residents in a manner which references to matters of world-wide interest could never do. The hero, who rejoices in the name of Alf, has been "at the front," and comes home from South Africa with money in time to frustrate the villain. He then announces his intention of "putting up the banns to-morrow." The lady's name is Nell, but she does not appear. The Hildenborough maidens evidently cannot bear to realise the dramatist's beautiful ideal. Mr. Archer thinks that "the virulence of the anti-German sentiment is a little unfortunate. On the other hand, the main moral—the lesson against discontent and crowding into cities—is excellent, and very vividly and pointedly enforced. The acting was extremely creditable. All the players spoke up well, and had none of the restless self-consciousness of the ordinary amateur." The critic further deplores the lack of enterprise on the part of the girls of the village. Perhaps they have all gone off to the town.

The Village Play.

THERE is an article in the current number of *Macmillan's Magazine* with the title "The Failure of the Elementary School." We have heard of it before, but with a kind of dull patience we compose ourselves to give the author fair consideration. His text is the sentence, well known to all of us, which stands in the introduction to the Code, and which most of our readers have by heart—"The purpose of the elementary school.....the work of life." The product of the elementary school, then, is distinguished by "superficiality, helplessness, and a glaring lack of initiative." The remedies are "a better choice of mental food"—that is, a reorganisation of the curriculum—and the appointment of inspectors who are not specialists, but "men who are experts in the details of school-keeping under the conditions which obtain in elementary schools." With regard to the curriculum, salvation lies in closer grouping and correlation of subjects. The writer sees in the present state of affairs a lack of definite aim, which makes him look back rather longingly upon the old *régime*, "under which the child *did* leave school able to read intelligently, to write a straightforward letter, and to make such computations as are necessary in daily life." The whole paper is thoughtfully written, and well deserving of the study of all educationists. Teachers will find the other articles of this issue very interesting, especially that on "The White Man and the British Empire." Mr. Edwin Pugh's short story is also very good.

The Critic Again.

THERE is a serial story at present running through the *Munsey Magazine* which for interest, power, and moral earnestness takes very high rank. This number also contains beautiful reproductions of the works of Burne Jones; an interesting article on "America's laureate," Longfellow, which is, however, more patriotic than literary; and one on Ellen Terry, whom Charles Reade once described as "a duck"—and so say all of us. Even the advertisements of this magazine are artistic and informative. The student of humanity will cull from them a great deal of knowledge of the American point of view.

The "Munsey."

IN the sixpenny monthly *Good Housekeeping*, which is edited by Henry Stead, there is a large amount of useful and entertaining reading for lady teachers, including fiction, without which no magazine can hope to exist to-day. As for our old friend *St. Nicholas*, our nursery department reports that it is "gooder than ever." The story of the kitten that forgot how to mew has been voted "orfly jolly," and the pictures are "rippin'." The paper caters well for all ages up to fourteen, and is distinguished by the excellent quality of its verse—a rare distinction in the magazine world.

Home Papers.

THE following is taken from an outspoken article on "Reading Aloud," by Miss Fanny Johnson, in the current number of the *School World*:—

Plain Speaking.

"The majority of grown persons, men or women, nowadays find themselves at one time or another under the necessity of saying a few words in public. How often, in such circumstances, does one blush at the uncouth display made by one's own familiar friend or acquaintance. It is not necessary that all men or women should be eloquent. But a modicum of *elegance* in speech and bearing surely ought to be looked for as a matter of course. English *men*, especially, often seem to be indifferent almost to indecency about their appearance and manner in public. I have seen distinguished speakers, men of world-wide renown, adopting attitudes and habits upon a public platform—nay, in the House of Commons itself—that ought not to be tolerated in a civilised community. One great statesman fidgets with his collar, another rubs his trouser leg, a third bobs his head up and down as he stoops over his notes. American, French, and German speakers are far superior to us in these respects. Bearing and carriage are part of good speaking, and should be taught to school pupils by way of the reading lesson."

IN the *Empire Review* Mrs. Massy describes a visit to an ostrich farm in Whitchurch. She writes:—

New Zealand Ostriches.

"The flock of ostriches was about seven hundred in number. They were all shut off in different paddocks, and classed according to age and other qualifications. For instance, I heard the manager asked by one of the party where the two

dangerous and very savage birds were. 'They are all right,' was the reply; 'I shut them up safely in the far paddock. We will just walk through this flock of young ones.' He opened a gate, and we found ourselves in a large grass field, where there were a great number of birds. When they saw us coming in they walked up in a most friendly way, taking a good look at us as we strolled across the paddock. I was moving along, slowly asking questions about the birds, and thinking one of our party was on my right, I turned to make a remark, when great was my surprise at finding, instead of a friend, a large ostrich stalking by my side, and keeping quite close to me, whilst he watched me with a pair of large and very bright eyes, dark brown in colour, and full of intelligence. The manager seemed to think the bird had taken a fancy to my gold-topped sunshade, and it was the shining handle that interested him so much. The birds were not in the least shy, and escorted us to the gate at the far end of the field; and when we got into the road they slowly turned away, looking as if they thought they had done all that politeness demanded. It was a strange sight to see so great a number of these large birds in a semi-tame state, far away from their free and limitless home in the golden sandy deserts of burning Africa. After leaving the paddocks we went to the factory, and the whole process of preparing the feathers was explained to us. When the feathers are considered sufficiently grown and fully matured, a certain number of the ostriches are driven in, and a bird is placed in a small kind of box that comes up to about the shoulder or joint of the wing, the box being shaped somewhat like a miniature horse-box, such as is used for shipping horses and slinging them into the hold of a vessel. When the bird is shut in, they raise the wing over the side of the box, and it is held whilst the plumes are cut off with a pair of clippers, leaving about a couple of inches of the quill, which the bird sheds naturally later on. This clipping of the feathers is a much better and more humane method than the old and barbarous one of pulling them out. Finally we saw the various processes of dressing and preparing the feathers by dyeing and bleaching before being made up in boxes ready for sale. There were white cardboard boxes full of feathers, of all sizes, in black, white, and natural colours. One superb white boa was specially admired."

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The Legend of the Lark.

"ON some sweet meadow Shelley heard and knew the secret of its being. From no bird's heart escaped that glorious strain. 'Bird, thou never wert!' Some pilgrim rather from the farther skies ever seeking to return upon the forgotten path. Some maiden goddess from the long ago who, looking down on earth, discovered human love, longed for and was forbidden its delights. Yea, the tale might go: Beneath Jove's wrath down-driven from the skies, she sought her lover, weeping in her need; and he, because he had a changeful human heart, and found her his, did turn from her away. Then by some lone ruin plaining of her woes did she not stray; till peeps Minerva's owl, to pity and to plead for her before the throne of Jove. He brought the message back: 'That for her sin she must for ever dwell on the black earth, no tree might harbour her, no hedge protect her, no roof claim her. Her beauty, that drew the eyes of man upon her, shall be lost to her. Nothing shall she keep of her heavenly birthright save her voice; and with that, since there was no sweeter singer in the heavens, she might come, when the skies were full of summer and Jove himself looked kindly upon the earth, to sing half-way before his throne.'

"So was she turned into a lark, the messenger of the skies, who, upward soaring, tells therein of all the doings of earth, and prays forgiveness of our frailties; who, sinking through the blue, sings to us of the glories of that far heaven which for a moment's space she had there seen." — *Dora Sigerson Shorter in the "Westminster Gazette."*

* * *

Vom Schulbureaukratismus.

DER Braunschweiger Lehrerverein behandelte eine Briefkastenanfrage, deren Beantwortung aber nicht zum Abschluss gekommen war. Die Frage lautet, "Ist dem Vorstand bekannt, dass ein hiesiger Schulinspektor verschiedenen Stadtverordneten korrigierte Schülerhefte vorgelegt habe, welche übersehene Fehler enthielten; dass der Herr aus diesem gewiss immer wiederkehrenden Versehen die Notwendigkeit der jetzt bestehenden Schulaufsicht gefolgert haben soll? Falls die Angelegenheit auf Wahrheit beruht, was gedenkt der Vorstand zu tun? War den Herr—von der Moralität abgesehen—überhaupt zu seinem Vorgehen berechtigt?" In der Zwischenzeit war nun folgender Tatbestand festgestellt worden: Ein Antrag des Herrn Stadtverordneten Fricke hat den Schulinspektor Former veranlasst, mehrere Mitglieder des Stadtverordnetenkollegiums aufzusuchen und Ihnen einige nicht genügend korrigierte Schülerhefte zur Einsicht vorzulegen. Dieser Vorgang an und für sich und die ihr begleitenden Bemerkungen bezweckten offenbar, die gesamte Lehrerschaft der Stadt hinsichtlich ihrer Zuverlässigkeit in den Augen jener Herren herabzusetzen. Das ganz im geheimen betriebene Unternehmen ist zur Kenntniss des Vorstandes des Braunschweigen Lehrervereins gelangt. Der Verein ist der Ansicht dass Herr Former die ihm zustehenden amtlichen Befugnisse in ganz erheblichem Masse überschritten hat, und er hat diese Meinung in einer einstimmig angenommenen Resolution gefasst.

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L'Art et la Poésie d'Angleterre.

NOUS extrayons ce qui suit d'un discours prononcé par M. Delattre, professeur d'Anglais à Toulouse: L'Angleterre est le pays le plus commerçant et le plus pratique, mais c'est celui aussi qui possède la poésie la plus intime et la plus spiritualiste qu'il y ait au monde, celui où après le rude coup de collier de l'initiative personelle, succède, sans transition, le plus sublime envol vers l'idéal. L'art anglais tout entier n'est fait que de tressaillements intérieurs et de rêves nostalgiques, que du reflet, il semble, de cette clarté d'idéalisme planant sur l'Ile aux blanches falaises. Tous ses peintres et ses poètes ont proclamé vaine l'œuvre d'art qui ne visait pas à affranchir l'âme du Réel et à la replonger dans l'Infini. Et tous, revenant avec amour vers les sentiers de leur enfance, "ont suivi religieusement, selon le mot de Wordsworth, la chère empreinte de pas commémorative de leur grandeur première." Leurs claires années de pension apparaissent dans leurs souvenirs, comme l'époque bénie de leur vie, celle la plus heureuse, et la plus féconde. C'est avec une gratitude émue, enfin, qu'ils ont toujours songé, leur automne venu, à leurs maîtres d'autrefois, à ceux qui avaient fait, en un avril lointain, éclore leur âme.

* * *

Gegen das Bildungsmonopol der besitzenden Classen wendet sich Paul Hofmann in der *Hilfe*. Er erinnert an den Ausspruch Schmollers, wonach der letzte Grund aller sozialen Gefahr nicht in der Dissonanz der Besitz— sondern der Bildungsgegensätze liege. Es sei daher die höchste sittliche Aufgabe jedes Kulturstaates, diese Bildungsgegensätze auszugleichen. Das Monopol der Bildung sei für die Masse des Volkes vielleicht das gefährlichste von allen Monopolen. Bemerkenswert es, dass auch die *Kölnische Zeitung* diesen Ausführungen zustimmt. Auch sie erhebt den Ruf "Bahn frei dem Recht auf Bildung!"

Next Month the Editor hopes to offer an interesting paper entitled **"Dr. Somervell on Music Teaching."**

The Book Lover.

I.—"*THAT SWEET CITY WITH HER DREAMING SPIRES.*"

WE have received from Messrs. Macmillan a charming edition of two poems by Matthew Arnold—namely, *The Scholar Gipsy* and *Thyrsis*, with illustrations by E. H. New. The small volume will be a source of lasting delight to every book lover, and is of special interest to all educationists who hope to attend the Conference of the National Union of Teachers at Oxford next Easter. For the scenic background of each of these two poems is the country round about the poet's beloved "sweet city with her dreaming spires," which, he assures us, "needs not June for beauty's heightening"—a consideration for those who hope to visit it in the spring-time, which may, or may not, be balmy.

THE CORNFIELD.

It is to be hoped that this delightful book will not wile away the delegate from his duty to his constituents. It will, however, be a great temptation to many to wander away with this volume in hand in quest of the spot where the poet read the story of the Scholar Gipsy in an old book one August afternoon.

"The story of the Oxford scholar poor,
Of pregnant parts and quick inventive brain,
Who, tired of knocking at preferment's door,
One summer morn forsook
His friends, and went to learn the gipsy lore,
And roamed the world with that wild brotherhood,
And came, as most men deemed, to little good,
But came to Oxford and his friends no more."

Or he may go in search of "the stripling Thames at Bab-lock-Hithe;" or to find the place of "the abandoned lasher" above Godstow Bridge; or wander through the lanes and river paths frequented by the self-banished scholar, whom the poet pictures in his mysterious wanderings—

"Still nursing the unconquerable hope,
Still clutching the inviolable shade,
With a free, onward impulse brushing through,
By night, the silver'd branches of the glade—
Far on the forest-skirts, where none pursue,
On some mild pastoral slope
Emerge, and resting on the moonlit pales,
Freshen thy flowers as in former years
With dew, or listen with enchanted ears,
From the dark dingles, to the nightingales."

The second poem of the volume, as every lover of Arnold knows, is a monody, to commemorate the author's friend, Arthur Hugh Clough, who died at Florence in 1861. "Clough must have been a rare and lovable spirit," writes a well-known critic, "else he could never have so wrapped himself within the affections of true men." And we have in this poem a tribute to friendship which has been ranked by critics of repute with *Lycidas* and *Adonais* and *In Memoriam*, and with the lesser known, but to some of us even more exquisite, *Ave atque Vale!* of Swinburne.

Every Arnoldian, and there are many among book-loving schoolmasters, will be charmed with the artist's exquisite drawings of North Hinksey Churchyard—

"Here came I often, often, in old days—
Thyrsis and I: we still had Thyrsis then;"

of "the track by Childsworth Farm;" of North Hinksey from the Footpath; of the Fyfield tree; of South Hinksey from the Causeway; and of "*the* Tree, bare on its lonely ridge." And wandering within sight of "the Hurst in spring" the delegate can con once more the well-loved lines—

"It irked him to be here, he could not rest.
He loved each simple joy the country yields,
He loved his mates; but yet he could not keep,
For that a shadow lour'd on the fields,
Here with the shepherds and the silly sheep.
Some life of men unblest
He knew, which made him droop, and fill'd his head.
He went; his piping took a troubled sound
Of storms that rage outside our happy ground;
He could not wait their passing—he is dead.

"So, some tempestuous morn in early June,
When the year's primal burst of bloom is o'er,
Before the roses and the longest day—
When garden-walks and all the grassy floor
With blossoms red and white of fallen May
And chestnut flowers are strewn—
So have I heard the cuckoo's parting cry
From the wet field, through the vext garden trees,
Come with the volleying rain and tossing breeze:
The bloom is gone, and with the bloom go I!"

II.—"*THE MAGIC CHARM OF PERFECT WORDS.*"

MRS. C. W. EARLE, the writer of *Pot-Pourri from a Surrey Garden*, is one of the few authors of the present time who treat the mother tongue with the reverence which is its due; one of the diminishing few who

appreciate and value "the magic charm of perfect words." There have been three volumes—or shall we say vases?—of *Pot-Pourri*, and concerning the second *Punch* wrote some time ago: "It is just the friendly chat of a lady who has not only read books, but knows all about her kitchen, and, if possible, more about the garden she loves." This describes fairly accurately Mrs. Earle's newest book, which is entitled *Letters to Young and Old* (Smith, Elder, and Co.), and which now lies before us.

Frankly, we have not read the volume from cover to cover. It is not a book of that kind. One must not borrow but buy it, for it is a companionable book, and one of many moods.

The first section consists of letters from Germany, full of excellent descriptions, wise and witty comment on men, women, and things, and interesting information of all kinds. Then follows a group of miscellaneous letters, touching lightly but sensibly on most of the topics which interest everyday people, including *education*—we really believe that education does at the present day interest the general reader. Now these educational opinions appeal to us as possessing a freshness and conviction which the professional pronouncement usually lacks. Let us quote a few of them:—

"It is not right that children should feel ready to cry with the difficulty of what they are trying to learn."

"I suppose with every one the real object of education is to give high character. In my opinion this largely depends on good physical health. We have to counteract centuries of belief that injuring the body will wipe away moral weaknesses, or what are called 'sins.' Every child, I think, should be taught that it is born good, and that falling away from good is its own fault."

"Nothing is all bad; and the right teacher, both of children and men, is one who sees evil enough to avoid it, and without persecution develops the good."

The third section of the book deals with health and food, and though Mrs. Earle is a vegetarian, while *The Practical Teacher* is not, this portion of the volume appears to us to be packed tightly with what we like to call *un*common sense. We have not space to quote, but recommend all teachers who are taking a keen interest in this important subject—and who at the present day is not?—to read and study the opinions of the writer for themselves. Some "Cookery *Receipts*" are also given, but as the proof of the pudding is the eating, a mere literary opinion upon these would be less than useless. In the last part of the volume Mrs. Earle writes charmingly on her favourite subject—gardening—drawing, like Dean Hole, all the inspiration and refreshment, both physical and spiritual, from this the first and chiefest "varied occupation" which it is so well able to afford.

At intervals throughout the volume are inserted some of the most charming verses and prose passages which are to be found in the language. Many of these are well known, though always fresh and inspiring. Two of the verse passages we append. They may not be known to some of our readers.

SOMEWHERE.

"Somewhere in pale sorrow's train
Comfort comes unbid.
Somewhere in the bounds of pain
Links of love are hid.
Somewhere with the barren load
Golden sheaves are bound.
Somewhere on the last lone road
A friend is found.

IN A GARDEN.

"I sometimes sit and wonder
In the quiet twilight time,
Looking down the valley yonder,
Whence the night begins to climb,
What the other women feel like
Who are born to sin and crime.

"I wonder if they find it,
This world, at all as sweet
As I? or if they mind it,
The mire, about their feet?
If their hearts beat just like my heart,
Or with a sadder beat?

"If their lives at their beginning
Were like mine when mine began?
Or if the way to sinning
Started forth beneath a ban,
Through a wilder, wearier country
Than where my pathway ran?

* * * * *

"I sometimes think it may be
That there's nought in outward show,
That the many things that stay me
From the way the others go
Make my virtue like a conquest
In a fight without a foe."

G. COLMORE.

III.—*THE INFLUENCE OF THE "GENIUS LOCI."*

ONE of the most striking characteristics of present-day education is the determined effort of the best educationists to connect the lessons given in the class-room with the daily life of the pupils and their relatives and friends. Everything must begin, like charity, at home. Geography is taught on this plan; in due time literature also will be taught by the same method; while there is, further, a definite attempt to connect school history with the surroundings of the pupil. At present, it is true, "local history" is somewhat dry-as-dust in character; but as we proceed we shall doubtless blunder upon more interesting and enlightened methods of treatment. A volume lately published by Mr. T. Werner Laurie ought to help London teachers to impart the necessary element of realistic interest to their lessons in history.

POPE'S GROTTO.

It is entitled *Literary London*, and is the work of Elsie M. Lang. Moreover, it rejoices in a preface from

that brilliant coruscationist, Mr. G. K. Chesterton, who has our very sincere sympathy, seeing that he has to live up to such a reputation as he has achieved. It

Interior of St. Clement's Danes Church.

must be immensely difficult to scintillate every day and all day to the order of editors and publishers. Says Mr. Chesterton :—

"The trouble about people living in a big city is not that they do not know anything about the country; it is not that they do not know anything about pigs, or about primroses, or about the cuckoo. It is that they do not know anything about houses, or railings, or lamp-posts, or pavements. It is that they do not know anything about the great city. People say that the country is more poetical. It is not true. The town would immediately strike us as more poetical if we happened to know anything at all about the town."

"The whole charm and glory of London consists in the fact that it is the most incongruous of cities. Anywhere in London an American bar may be next door to a church built before the Crusades. A man may very well be exasperated with London, as he may be with the universe; but in both cases he has no business to be bored with it."

The aim of the authoress is to charm away this spirit of boredom by opening the eyes of those who walk the streets of the wonderful city to the associations which hallow its romantic and unromantic places. Bedford Street, Covent Garden, is uninviting enough, especially in the beginning of the day before the cabbage leaves have been swept away; but the Earl of Chesterfield lived here, and so did Sheridan, with whom Dr. Johnson came to dine, religiously touching each post as he walked along. Bond Street is frivolous enough to-day, but Gibbon the historian used to lend it ponderosity, and Thomson of the *Seasons* found here a lodging in the house of a milliner; while many of the scenes of *Tom Jones* were placed in this street. We shall walk through it again, and more slowly.

Boswell, too, had lodgings here, and one night, somewhat late, there issued from his hospitable door a party of well-dined immortals—Dr. Johnson, Sir Joshua Reynolds, Garrick, and Goldsmith. Picture them!—Johnson heavily delivering himself to Sir Joshua, who does not need his ear-trumpet on this occasion; Garrick and Goldsmith arm-in-arm, on the same principle that jerry-built houses are safe if built in a row.

Camberwell is sacred to Browning—and Dr. Macnamara. In Chancery Lane Coleridge saw the poster which tempted him to enlist in the 15th Dragoons, and almost caused us to lack the *Ancient Mariner*. Chelsea has eight pages of the volume, and at night is peopled by the ghosts of More, Holbein, and Erasmus. The last-named wrote a testimonial to the district. One wonders if he did it for a consideration.

"All its inhabitants, male and female, applied their leisure to liberal studies and profitable reading, although piety was their first care. No wrangling, no idle word, was heard in it; no one was idle; every one did his duty with alacrity, and not without a temperate cheerfulness."

The "temperate cheerfulness" is excellent when we think of the later famous but atrabilious inhabitant of a house in Cheyne Row.

So the pleasant book runs on. It is arranged alphabetically, and is interesting from cover to cover. It comes from Clifford's Inn, where Charles Lamb's friend, George Dyer, "drudged at low rates for unappreciative booksellers." *Absit omen.*

SOME BOOKS TO BE BOUGHT, BEGGED, OR BORROWED.

A Staff Officer's Scrap Book. By Lieut.-General Sir Ian Hamilton. Second volume (Edward Arnold). The author continues his story from the point where Kuroki comes within striking distance of the positions he was expected to take up before Liao-yang, and considers the great battle which took place there, the battle of the Shaho, and the engagements immediately following. Written with considerable literary skill and charm, and remarkable for the readiness of its portraiture and the clear impressions left by its descriptions.

Everyman's Library. Fifty new volumes (J. M. Dent and Co.), containing Lockhart's *Life of Burns*, an edition of the *Spectator*, and Ruskin's *Seven Lamps*, among other interesting and useful volumes.

The Cambridge Modern History, Volume IV. (Macmillan and Co.). Invaluable to all history students. Chapters by various specialists dealing not only with the military events of the time, but also with the constitutional and religious issues, contemporary literature, and philosophy.

Italy of the Italians. By Helen Zimmern (Pitman). *Burma.* By Sir J. George Scott (Alexander Moring). *The Tourists' India.* By Eustace Reynolds Ball (Swan Sonnenschein). *From West to East.* By Sir Hubert Jerningham (Murray). Four up-to-date books for the teacher of geography who wishes to add realistic interest to his school work.

The Public Schools from Within. Written chiefly by Schoolmasters (Sampson Low). Thirty-two essays reprinted from the *Times*. The "public schools" on their defence, and very much alive.

The Whirlwind. By Eden Phillpotts (Chapman and Hall). A vivid tale of Dartmoor and its people.

A Blind Bird's Nest. By Mary Findlater (Methuen). Another Devonshire story of the mid-Victorian era.

Queens of Old Spain. By Martin Hume (Grant Richards). An interesting and well-written study of women who have been "the power behind the throne."

"*Religio Medici*" *and Other Essays.* By Sir Thomas Browne. With an introduction by Charles Whibley (Blackie). A dainty edition of the work of "a musician who played upon the instrument of speech with the skill of a conscious artist."

The Works of William Shakespeare. India paper edition (Nelson and Sons). The whole of the works in four pocket volumes, in large and beautiful type.

The Practical Infant-School Teacher.

THE INFANT VOICE.

BY T. MASKELL HARDY,

Music Director of Wandsworth Technical Institute; author of "How to Train Children's Voices," "Practical Lessons in School Singing," etc.

UNTIL within quite recent years the plan of teaching singing in the vast majority of schools has consistently ignored the question of *training* the children's *voices*. As long as the various inspectors' tests in time and tune could be sung from the blackboard with confidence and precision, then all was well. What need was there to trouble about the quality of vocal tone employed and the false intonation brought about by allowing the children to shout and bawl in their "natural" voices? Nay, even if the youngsters literally made "the welkin ring" in their enthusiastic rendering of the *Taa-taa-tai* and *Lah-lah* exercises, it but showed that they were "singing heartily and enjoying the work." Happily, we are beginning to "change all that," and are gradually learning that it is of even more importance to send a child out from school with a sweet and cultured voice, capable of singing *in tune* and with *pleasure to listeners*, rather than with the power to sing correctly all the time and tune exercises ever written, but only with the voice of a bull of Bashan.

The importance of Voice-training in Schools.

Lest I should be misunderstood, let me say that I am not decrying in the slightest degree the power to sing at sight in correct time and tune, but the sacrifice of beautiful tone in its acquirement, because under proper guidance both the accomplishments may be easily attained together. Fortunately, as I said above, we are beginning to recognize the value of vocal training in the schools, and several works have been written dealing with the treatment of this subject in the senior schools. As far as I am aware, however, nothing of the sort has been written for the guidance of teachers in infants' schools, and for their benefit I propose giving a few hints, which shall be both useful and practical.

It may be urged that the voices of infants are too young for training—and if by training we understand the arduous discipline which is undergone by professional singers, this is true; but as the little ones *are* taught to sing, and as they are always taught either in a right or a wrong way, I feel sure that many teachers will welcome a few hints, if not upon the method of training the children to become solo singers, yet upon the various plans by which their pupils may be taught to sing sweetly, in tune, and, above all, without permanent injury to their delicate vocal organs. If only this last advantage be gained, these articles will not have been written in vain.

Before proceeding to lay down any rules and plans for training and cultivating the children's voices, I will first point out three great obstacles which generally obtain in the infant school — obstacles which, although they will effectually prevent the attainment of good vocal tone, and will tend to spoil the child voice throughout its whole career, can easily be removed by any earnest teacher, however little she may be accomplished, either as a musician or as a voice trainer.

Obstacles to Good Tone.

The first, and unfortunately the commonest, of these obstacles to good and correct voice production by little children, is that of allowing them to perform their various vocal exercises in a *loud* tone. By vocal exercises I mean not only exercises in *singing*, but every possible exercise which involves the use of the voice in any manner. All teachers know how little children delight in trying to shout each other down when they are repeating tables simultaneously, or when the teacher is trying to fix in their brains, by means of constant repetition, the mystic information that *c a t* spells cat. Another infant-school practice not unknown to teachers, and one which places a premium on the yelling and shrieking powers of the children, is that of the teacher pointing to a picture, and saying to the class, "What is this?" To which the little ones in a voice—raucous, loud, and ear-splitting—shout back, "A pig!" "What is it?" again queries the teacher; and once again, with greater unanimity and still greater force, comes back from the delicate throats of the children the reply, "A pig!"

Evils of Loud Tone.

Simultaneous reading and repetition of poetry and Scripture also encourage loudness of voice from the very fact that the teacher is apt to look with suspicion on the child who is not doing his best—which best, to the child's mind, and often to the teacher's, consists in shouting more loudly than his fellows.

The second great fault in the infants' school, and one which militates greatly against good production, is the immense amount of work which the little throats are called upon to perform day after day. When we think how, in the vast majority of lessons given—such as reading, repetition of addition and multiplication tables, poetry, Scripture, spellings, information taught in the object lessons, etc., singing in the kindergarten and the numerous singing games, as well as the singing of the various musical exercises and ordinary school songs—not only individual but *all* the delicate little throats are often at work for very protracted periods of time, we shall see that a great strain is put upon these tender

Overwork of the Vocal Organs.

organs just at the very time when they are least able to stand such strain.

The third common fault to which I would draw attention is the practice of pitching, or allowing the children themselves to pitch, the various vocal exercises far too *low*. Even in the pitching of the various songs, where the required pitch is always indicated on the music score, the teacher will often begin the tune from memory, and, especially if she herself possesses a contralto voice, frequently at a much lower pitch than that suitable for little children.

Evils of Low Pitch.

Much more glaring is this fault in the repetition of tables, simultaneous reading, etc., for then the pitch is generally set, not by the teacher, but by one of the boys with the greatest amount of self-assertion in the class; and his assertion will generally show itself in the loud, strident, and low-pitched voice of the playground and the street.

Now, as long as the three faults enumerated are allowed to continue, sweet and beautiful school singing is practically impossible. Fortunately, as I said above, their eradication, although requiring a considerable amount of patience on the teacher's part, is a comparatively easy matter.

First, as to the matter of *loudness*. Let the teacher constantly bear in mind the old adage that "Example is better than precept," and invariably endeavour to speak in a sweet, pleasant, and restrained tone of voice herself, so that it may be said of her, as King Lear said of the dead Cordelia, "Her voice was ever soft, gentle, and low, an excellent thing in woman." And here, in passing, let me say that the term "low" must have been used by King Lear as opposed to strident and raucous, and not as the antithesis of high in pitch. The term "teacher's voice," especially when applied to a lady's voice, is constantly used as one of reproach; and it is even sometimes asserted that a lady teacher may be easily recognised in private life by the tearing, piercing, and generally unmusical quality of her voice.

Importance of Teacher's Example.

Teachers, when advised to speak softly and gently to their classes, often plead as an excuse that unless they talk loudly they will not be heard by the children. Speaking, however, after many years' experience, I can safely assert that not only this inability to make one's self heard when speaking softly, but also most of the laryngeal troubles to which the teacher falls so often a victim, can be entirely obviated by a proper control of the breath; and, as was said above, the matter of example is of such prime importance when teaching very young children that I propose giving first of all a few hints and exercises on breath control, etc., for the *teacher's own personal use*.

The secret of making the voice "carry" without strain or fatigue to its user, as in the case of good singers and elocutionists, is the reinforcement of the original tone generated in the larynx by means of the resonating cavities of the body, of which the chief are the mouth, the pharynx or upper part of the throat connected with the mouth, and the chest.

Voice-training for the Teacher.

To get the maximum amount of vocal tone with the minimum amount of trouble, the mouth must be well opened, not only at the front, but at the back too—that is to say, the soft palate must not be allowed to droop towards the tongue, but must be kept well up, almost as in the act of yawning. The throat must be "loose," with no sense of constriction or pressure upon it; in fact, the speaker or singer should feel quite unconscious that she possesses a throat at all for the time being.

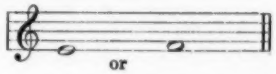
Lastly, the chest *must be kept erect* during the voice-using, and the speaker must endeavour to "speak from the chest." This is by no means the same thing as using what is known as the "chest voice" or "thick register," as will be shown later on. By speaking from the chest, I mean that the lungs must be conveniently full of air, the chest kept well erect, and in speaking, instead of the air being allowed to rush through the larynx uncontrolled, it must, as it were, be *pressed back into the chest*, so that the vocal tone may be reinforced, not only by the resonance of the well-opened mouth and pharynx, but also by that of a *column of condensed air*. The control of the breath in the manner just described is very important, not only for its own intrinsic value, but because it helps to secure the loose throat and open mouth also.

Exercise 1, for securing breath control. Place the hands upon the waist, the thumbs towards the back, and the fingers upon the lowest ribs. *Inspire* slowly by first deliberately extending the ribs which are under the fingers, and then by just as deliberately filling out the whole of the chest and pushing it upwards into an erect position. When the chest is quite erect, begin to *expire* very slowly, gently pressing the fingers upon the ribs, but still *keeping the chest quite erect*, so that the breath may escape from the lower part of the lungs, and not from the upper.

Breath Control.

The exercise should be repeated until no difficulty is experienced in the matter of keeping the chest quite erect during the whole act of expiration. The act of inspiration should on no account be prolonged until discomfort is felt, nor should expiration be carried on until a feeling of exhaustion is the result.

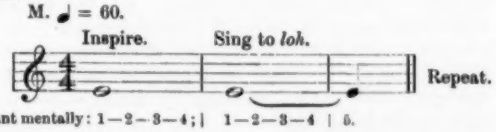
Exercise 2, for securing breath control. Inspire as in Exercise 1, then sing very softly, with the smallest possible amount of breath, to the syllable *loh*, a medium-pitched sound, such as E or F.



or

Be careful to keep the chest erect *during the whole act of vocalisation*. Sustain the sound in the first efforts for about five or six seconds, gradually increasing its length in further efforts, until it can be held for twenty seconds. But, as in Exercise 1, be careful that it be not unduly sustained and lead to exhaustion.

Exercise 3, for securing breath control. This exercise is not to be practised until Exercise 2 can be performed with the chest kept perfectly erect during the emission of a sound sustained for at least five or six seconds.



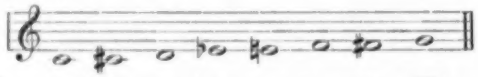
Inspire while counting four at the rate of metronome 60—that is, one beat per second. Sing the syllable *loh* exactly as in Exercise 2 while counting five.

In this exercise attention must be paid to the purity of tone produced—that is to say, endeavour to use no

more breath than is absolutely essential for the production of tone. The tone must not be "woolly" and obscured by the superfluous breath, neither must the breath be heard hissing *through* the tone, like the scraping of a saw. The singer must try to experience, even during the act of singing, the sensation of pulling the breath back, and forcing it down to the ribs again.

In this manner the tendency of the lungs and ribs to expel the air by returning to their original shape will be checked, the breath will be kept under the performer's control, and only the actual amount requisite for vocalisation will be used.

The exercise may be varied by singing it upon any or all of the following sounds which are found suitable to the singer's voice :—

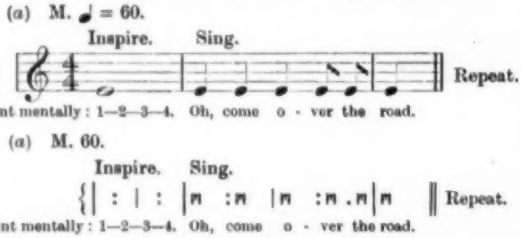


Exercise 4, for securing an open mouth. This exercise is to be worked exactly as Exercise 3, except that the attention should now be directed principally to the opening of the mouth (*a*) in the front, (*b*) at the back. The space between the teeth should be about three-quarters of an inch (the diameter of a shilling); and to ensure that this space is preserved, the singer should practise before a mirror, or a shilling may be inserted edgeways between the teeth.

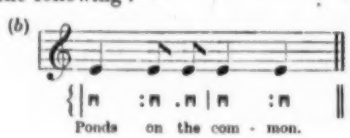
The Open Mouth.

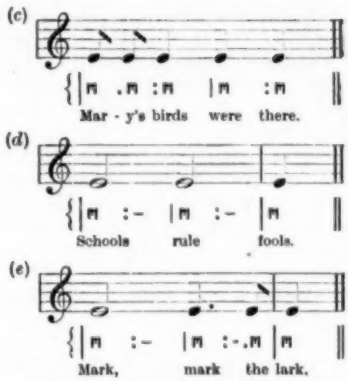
The cavity at the back of the mouth is enlarged and connected with the cavity of the pharynx by the raising of the soft palate. This is brought about by the singer imagining that she is about to yawn. The mirror must also be used to ascertain that the soft palate is not drooping towards the tongue. Inspiring through the nose and expiring through the mouth will tend to bring the soft palate under due control.

Resonance.

Exercise 5, for securing breath control and resonance in the singing voice.

(a) M. ♩ = 60.
Inspire. Sing.
Repeat.
Count mentally : 1—2—3—4. Oh, come o - ver the road.
(a) M. 60.
Inspire. Sing.
Repeat.
Count mentally : 1—2—3—4. Oh, come o - ver the road.

Inspire while counting four, then sing to one of the sounds mentioned in Exercise 3 the words, "Oh, come over the road." Keep the chest erect, and control the breath as in the preceding exercises. Keep the mouth well opened, and produce a full, round tone, especially on the vowel *oh*. Make the tone, as it were, proceed from the chest, so that full advantage may be taken of the chest resonance. Do not be satisfied with what may be called "lip resonance;" the tone must not be allowed to slip out of its own accord, but must be carefully kept in check, as in the foregoing exercises. Vary this exercise by using other phrases, such as the following :—





Take breath in each of these exercises, as in (*a*), and endeavour to obtain a full tone on each of the vowels, which should be made as "broad" as possible. Care must be taken in singing example (*c*) that the vowel *uh* (as in *cur*) be used in each word, thus—*Mur*-y's *burds wur thur*.

Exercise 6, for securing breath control and resonance in the speaking voice. Proceed as to breathing, etc., as in Exercise 5, but instead of *singing* the phrases *speak* them in a quiet, restrained tone of voice, pressing the breath down towards the ribs as in singing. Utter the words slowly and deliberately, making a slight pause between each. Be careful not to speak on a *low* tone. It is much better to talk on too high rather than too low a tone, as long as the breath is well pressed down towards the ribs.

The Speaking Voice.

If the above exercises are practised regularly for a few minutes *every* day, and the ordinary speaking voice be treated in just the same manner as recommended for the singing voice in the foregoing exercises, the teacher should gradually acquire a sweet and agreeable voice, capable of making itself heard for a considerable distance without fatigue or strain. The effect upon the children of such a consistent and beautiful example can hardly be overestimated.

Having learned to set a good example, the teacher must *insist*, in season and out of season, upon every vocal exercise without exception being performed in a gentle, restrained, and refined tone of voice.

The next point claiming the teacher's attention is the very great amount of work which the children's voices are called upon to perform. This can be obviated to a great extent by reducing *simultaneous* repetition, reading, and answering to its lowest possible extent. From the point of discipline alone the superior value of individual as opposed to simultaneous answering is apparent, although its adoption may for a time give a certain amount of trouble to the teacher who has been used to the more slipshod and happy-go-lucky manner. Even when the children *do* repeat their exercises individually, the teacher must insist that the tone of voice used is quiet, gentle, and restrained, and like "teacher's own voice."

Overwork of the Vocal Organs.

The third fault mentioned—namely, that of the use of too low a pitch—is one whose habitual practice will make beautiful voice production by the children an absolute impossibility. To eradicate this fault, the teacher must, when commencing a song, even of the simplest character, never trust to her memory of pitch, but invariably

Prevention of Low Pitch.

pitch the key either by the pianoforte, a tuning-pipe, or at least a tuning-fork. Not only should she do this at the *beginning* of a song, but at the beginning of every verse, and, if she find the children persistently flattening, at the beginning of every line also. Furthermore, when simultaneous repetition of any kind is practised by the children, they should never be allowed to start the pitch themselves, or more often than not it will be harmfully low. On the other hand, the teacher should carefully begin every exercise herself, starting rather too high than too low, and insisting upon a soft, singing kind of voice. As soon as the children begin to slip down to a lower pitch, she should stop them, and restart them upon the original sound.

The faults pointed out above, commonplace and unimportant as they may seem to the casual observer, strike at the very root of good production, and must be got rid of before any sensible improvement can be made.

In my next paper I hope to give a series of simple but effective exercises to be used by the children for the development of the "head voice" or "thin register," and the strengthening, beautifying, and preservation of the voice generally.

A JAPANESE FROEBEL.

AN ABSTRACT FROM A LETTER IN THE "ORIENTAL STUDENT," HONOLULU.

WE were awakened this morning by a familiar tune floating over the gray-tiled roofs of our windows. At first it was too familiar to seem strange, but as consciousness grew I began to locate myself, and the strangeness of it all made me jump up in a hurry. The tune was a popular kindergarten air, and to hear it sung by children's voices in the heart of Tokio caused us some surprise, not to say astonishment; but then we have only been here a few days, so know very little about the city or the people. It did not take us long to dress, you may believe; and after making the necessary inquiries, we hurried toward the kindergarten, taking with us a Japanese friend as interpreter.

It was only a short distance down the narrow lane to the picturesque bamboo gate from which hung the sign that notified the Japanese public of the nature of the institution within. There was time, however, for our friend to tell us a little about the teacher, who is considered, it seems, a great heretic by *some* followers of Froebel; but the mothers, she assured us, are most unanimous in their praise of the school, and the children cannot be kept at home even when too ill to attend. This was interesting, but scarcely prepared us for what we were to see.

The house, like all true Japanese houses, was rather small, unpainted, and presented no front whatever toward the street. We had to remove our shoes before entering, as the floor is covered with soft matting, and answers at once as floor, table, chair, and, I expect, even in this case, bed. The walls are delicate paper sliding doors of soft neutral tints, and are most convenient, for they can be opened anywhere, or taken out altogether, throwing the whole house into one room if desired. Imagine our surprise, if you can, to find the teacher a man—but such a man! One look into his shining countenance convinced us he was no common dissenter. As I watched him in the midst of the happy throng of children, a child himself, yet a leader of rare powers and almost superhuman insight, I was reminded forcibly of another misunderstood man in a little German village, at whom all the neighbours laughed, but whose spirit still lives while they are long forgotten. And I wondered if, perhaps, this so-called heretical disciple we had come to visit might not have caught more of the *real* Froebelian spirit than those who so harshly criticised his work!

As I stayed, my wonder grew. There was little about the place to remind one of a school—rather a happy, well-organised home. It was lunch time, and the forty and odd children, in picturesque kimonas—the girls in bright-flowered colours, the boys in sober shades—sat happily on the floor eating knick-knacks, and merrily talking and laughing. One whole side of the room opened out on to the little garden full of trees and flowers and birds and sunshine. It was a beautiful picture, including the little sweet-faced wife with her lovely baby in her arms, and the old grandmother hovering over a charcoal fire in the background, preparing us the inevitable tea.

The story hour followed, and though we could not understand a word, we were quite as interested in Taromoto's adventures as the children, who must have heard it many times, for it is a popular fairy tale in Japan. Not a sound could be heard but the musical voice of the teacher. The children seemed almost to cease breathing, while the eyes opened wider and wider as the story spun its way through the little peachling's wonderful adventures, until at the grand finale the excitement grew so intense it could be contained no longer, and broke loose in the enthusiastic "Banzai!" led by the teacher.

How I wished I could talk Japanese then! But lack of language could not restrain our enthusiasm; and as the teacher saw our unconcealed delight, he warmed to us, and told us much of his work, though unsympathetic criticism had made him reticent about it. All unconscious of the renovation the kindergarten has undergone in the Occident during the last ten years (kindergartens having been introduced into Japan about fifteen or twenty years ago), he had become convinced that the methods as too often used were dead, formal things, and either forced or retarded the normal growth of the child.

His convictions grew until he was inspired to open a child garden which should meet the needs of the child as nearly as he saw them. It was a hard pull, for he was poor, and the people around him were poor; but gradually the number of children crept up from seven or eight to twenty or thirty, and now he has over forty every day. His position is rather that of a father than a teacher, and he tries to make his kindergarten an ideal home, with as natural an environment as possible, fostering those qualities which make strong character. Ignorant of the great child-study work which is causing such a revolution in Occidental education, he has by himself conceived that method as the only true guide to a right understanding and consequent effective training of the child. In his own way, and unaided, he has been making these studies; and I believe, from the little I was able to gather in our short conversation, that they are full of unique, helpful material.

There was much more that he said which I could understand only imperfectly, but I saw that he was trying to do away with the formalism and symbolism under which, too often, the real spirit and object of the work lie buried. He was handicapped because he could find

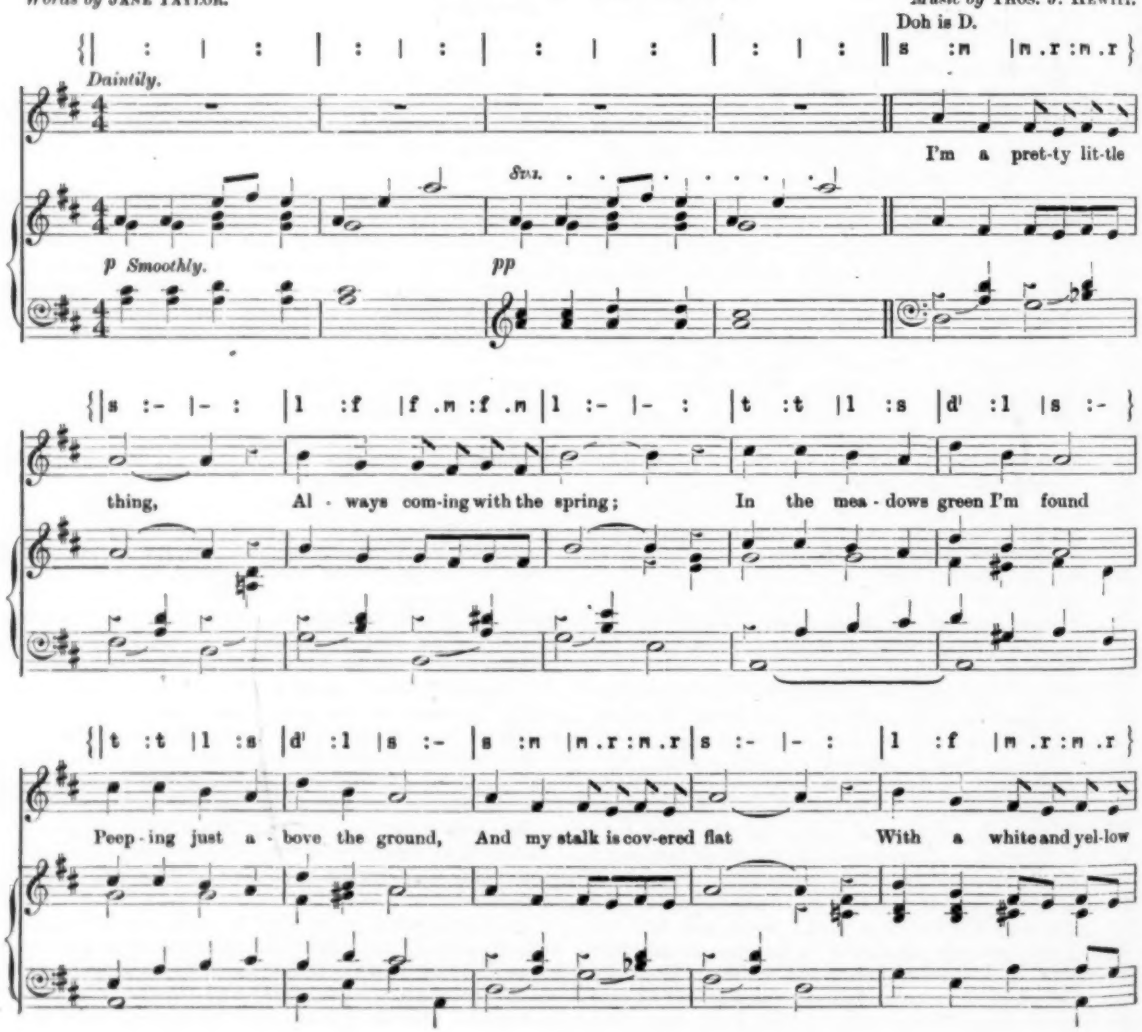
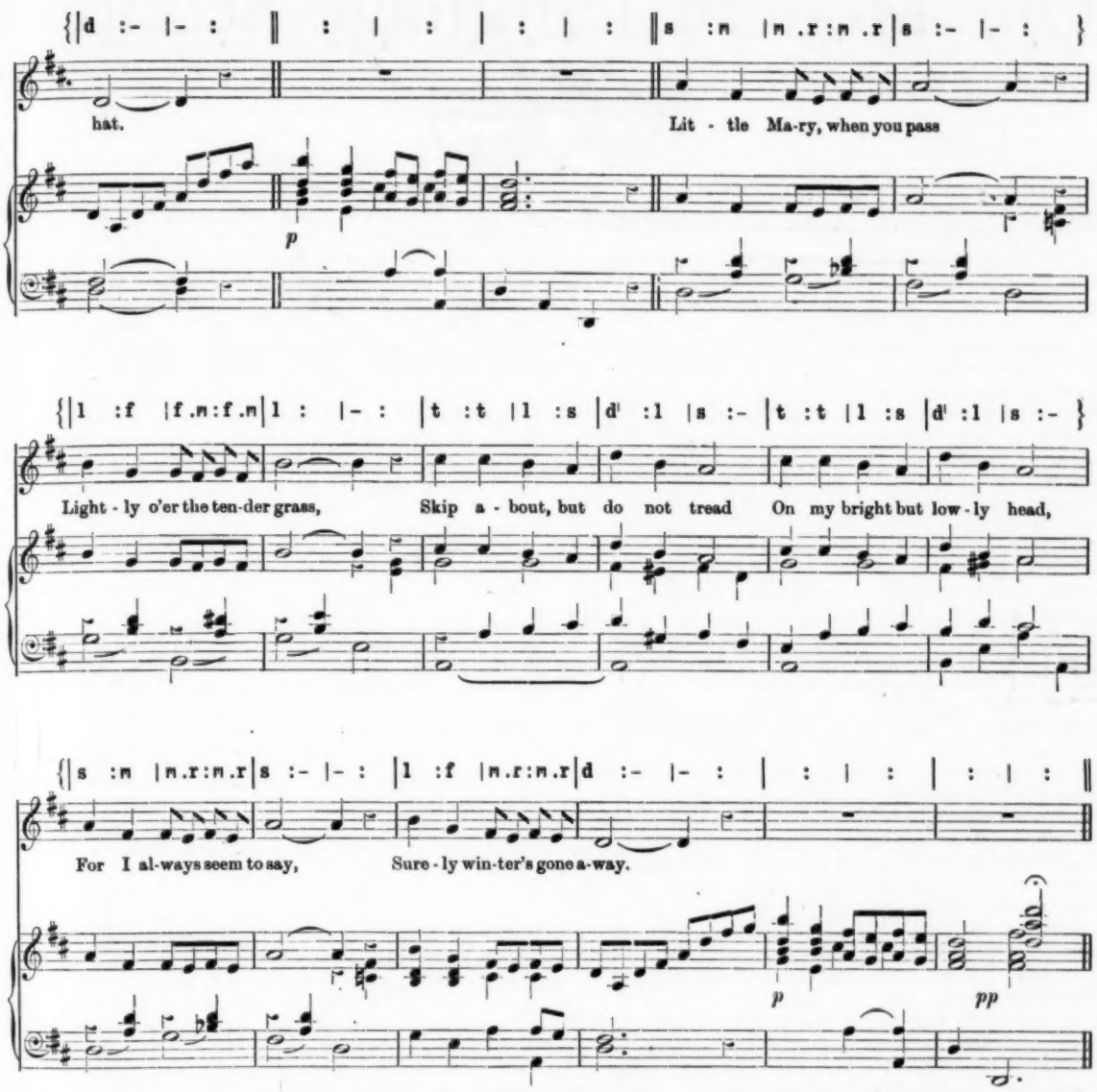
no one to help him who could carry out his ideas, young girls being too immature in his eyes. He publishes a little monthly magazine for mothers, containing most helpful suggestions for meeting the problems and difficulties of child-rearing. "The Proper Diet for a Child of Three, according to a famous English Physician," "Educative Toys for Children," "How to deal with Crying Children," "A Story of the Stork's Family at the Zoo, suitable to be retold to Children," are among the suggestive titles in one number.

He strongly disapproves of the ordinary Japanese toy, as it is too frail to admit of handling, and suggests few activities; so he spends all his spare time in designing, making, or superintending strong, wholesome toys. Again and again I thought of Froebel as he talked of his work, led on by our enthusiastic appreciation. After the games in the garden, where the man's genius shone quite as brightly as in the story hour, there was building with the blocks at tables, the children sitting on benches. It would not have been difficult to guess the all-absorbing topic in Japan to-day, for every little child made some form connected with the war, and the air was full of bugle-calls and war cries. Yet all were orderly and well-behaved. All too soon the morning slipped away, and we found ourselves bowing good-bye to the children as they came up politely in turn and, in the quaint manner of the Japanese, wished us "Sayonara."

"These are the future citizens of Japan," said the teacher, as he affectionately touched the shaved head of a tiny boy of four; and somehow his words seemed pregnant with deep and hidden meaning, for there is a language deeper than words, a language of the heart. Fortunate Japan, I thought, as we turned our faces homeward—yes, fortunate Japan to have such a man busy about his business of forming worthy citizens.

THE DAISY.

SONG FOR CHILDREN.

Words by JANE TAYLOR. *Music by* THOS. J. HEWITT.

Doh is D.
Daintily.
I'm a pret-ty lit-tle
Sva.
p Smoothly.
pp
thing, Al - ways com-ing with the spring; In the mea - dows green I'm found
Peep - ing just a - bove the ground, And my stalk is cov-ered flat With a white and yel-low

hat.
Lit - tle Ma-ry, when you pass
Light - ly o'er the ten-der grass,
Skip a - bout, but do not tread
On my bright but low - ly head,
For I al-ways seem to say,
Sure - ly win-ter's gone a-way.

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Our Modern Language Section.

PHONETICS IN THE CLASSROOM.

BY S. A. RICHARDS, B.A., GROCERS' COMPANY'S SCHOOL, HACKNEY DOWNS.

(*Second Paper.**)

ONE is apt to forget the difficulty which a beginner experiences in grasping the nature of a French nasal vowel. Nasal vowels do not exist in English; hence the conception is an altogether new one, and he is liable in this, as in so many other cases, to substitute an approximate English sound. For instance, unless the matter is properly explained, he will have a hazy notion that the vowel in *bon* is pronounced more or less like the English *long*. There will be a tendency to close up a nasal vowel by a consonantal sound. Though we have no nasal vowels in English, we do possess nasal consonants, and it will be found advantageous to begin our explanation by a reference to these as a starting-point, and to make clear the difference that exists between them and the nasal vowels. In the case of the consonants the oral passage is completely blocked—in *m* by contact of the lips, in *n* by contact of tongue and upper teeth and gums—and all the breath passes out through the nose. In the case of the vowels, part of the breath issues at the nose, part at the mouth. This can only be made clear by means of a diagram on the board showing the lowering of the velum and the opening of the nasal passages. The fact may be shown experimentally by means of a bright mirror and a card held so as to shut off the breath issuing at the nose from that issuing at the mouth. If we produce a nasal consonant, the upper half of the mirror will be dulled, an oral vowel will steam the lower part, while, if a nasal vowel be uttered, there will be two distinct patches left on the glass.

The nasal vowels should be practised in conjunction with the corresponding oral vowels, in pairs, thus: a—ɑ̃; e—ɛ̃; ɛ—œ̃; oe—ɔ̃. Insist on plenty of nasal resonance; English pupils are not likely to overdo it. The great thing is to get a pure vowel without any trace of a following consonant. Especially must this fault be guarded against when a dental or a labial follows the nasal vowel. In the first case an *n* is apt to be interpolated, in the second an *m*. Thus *conter* becomes [kɔ̃nte] instead of [kɔ̃:te], *tromper* becomes [trɔ̃mpe] instead of [trɔ̃:pe]. The point to insist on here is that the nasal vowel must cease before the following consonant is produced.

A useful mnemonic of the four nasal vowels is the phrase *un bon vin blanc* [œ̃ bɔ̃ vɛ̃ blɑ̃].

When all the vowels, oral and nasal, have been explained and practised by the class, oral exercises consisting of illustrative words should be freely used. It cannot be too strongly urged that, all-important as it is that the explanation should be lucid and the manner of production correct, nothing but continual phonetic drill will induce the habit of correct pronunciation. It is a fatal mistake to think, when once a vowel sound has been explained by the teacher and produced more or less correctly by the class, that it can be left at that. Boys will soon forget what they have been taught, and drift into slovenly and incorrect methods of pronunciation. Even if they can still, with conscious effort, produce the sound correctly, that is not enough; the habit of correct pronunciation must be formed. Copious oral exercises can alone bring this about. Even in advanced classes which have covered the ground completely an occasional ten minutes devoted to phonetic drill is advisable. Care must be exercised in the selection of the illustrative words: the vowel sound which is to be practised must be really prominent, and the consonants involved at this stage must be such as present no particular difficulty. Phonetic script alone is still to be used.

The semi-vowels should be explained with reference to the corresponding vowels. By still further narrowing the passage we can go from one to the other. Thus [i] becomes [j] if the tongue be further raised, [y] becomes [ɥ] and [u] becomes [w] if the lips be pinched more closely. Take such pairs of words as *fi—fille*, *su—suis*, *ou—oui*, [fi—fij, sy—sɥi, u—wi]. Especial care must be taken to distinguish [ɥ] from [w]. It is a common error to pronounce *suis* as [swi] instead of [sɥi]. The difference is entirely one of tongue position, and can be best explained by the method described above.

When the vowels and semi-vowels have thus been worked through and practised, the consonants should be considered. Here the two languages have more in common, but the differences must not be neglected. It is difficult to get rid of the little puffing sounds which accompany the utterance of the explosive consonants in English. They are distasteful to French ears, and must be conquered. Explain to the class that the breath must be more evenly emitted, more regularly controlled, in French than in English. Let the pupil think of *b* when he is about to utter *p*, and he will be nearer the correct pronunciation of the French consonant. The same remark applies to *t* and *d*, *k* and *g*. But still more important is it that he should learn to make vigorous use of his lips in the production of *p* and *b*. In English lip action is reduced to a minimum, and in the case of the labial consonants under consideration, the lips are almost blown apart forcibly by the expulsion of the breath. To produce the French *p* we must restrain the breath, and at the same time make use of conscious muscular effort in separating the lips. When we can say "papa" without extinguishing a lighted match held close in front of the mouth we shall have arrived at a pretty correct pronunciation.

Most of the French consonants require more voice than the corresponding English ones. It is therefore necessary that the pupil should get a clear idea as to what voice really is, and the difference between a voiced and unvoiced consonant. The vibration can be distinctly felt if the finger rest upon the top of the larynx.

Of all the consonants, *l* gives most trouble and needs

* The first paper appeared in the February number of *The Practical Teacher*.

most attention. The fatal habit of introducing a voice glide between a vowel and the following *l*, so common in English, must not be allowed in French. Contrast the English *eel*, pronounced [iul], with French *il*, pronounced [il]; the English *table*, pronounced [teibul], with the French *table*, pronounced [tabl].

It is comparatively easy to make the difference clear to a boy's mind; but how are we to get the correct pronunciation? There is only one way. Insist on the *l* being produced in the French fashion, with French tongue position. If the body of the tongue is allowed to lie flat, while only the tip is raised, the voice-glide must necessarily intrude itself. If, however, the tongue is raised bodily in a horizontal position touching the upper gums, not only in front, but also at each side, the action taking place rapidly, the vowel will remain pure. The artificial palate is the best means of showing this tongue position. Failing that, a diagram showing the points of contact will suffice. Plenty of exercises should be worked through, illustrating words commencing with *l*, final *l*, and *l* occurring in a consonant group, both initial and final—for example: *leur, fil, blême, blanche, table, débâcle.* In the case of words such as *table, débâcle*, it is necessary to make clear that any vowel sound that occurs *follows* the *l*. Thus, *une table* = [yn tabl]; *une table en acajou* = [yn tabl ɑ̃n akaʒu]; but *une table ronde* = [yn tablə rɔ̃:d].

It is not worth while troubling to teach the uvular *r*. It is certainly heard universally upon the stage and in Paris and other large towns. Even in the provinces in the north of France French people will tell you that they produce this consonant as we do, with the tip of the tongue, while all the time they actually make use of the *r grasseyé*. However, the front *r* is used by educated French people. It is always correct and free from objection, while the other presents such difficulty for English people that it is not advisable to waste time on it. Still, the pupil should know that it is used, how it is produced, and, above all, what it sounds like, or it will puzzle him when he comes to hear French people talk, and add one more difficulty to his understanding fluent French.

The consonants *m* and *n* should be fully voiced, otherwise they do not call for special notice. Such is not the case, however, with [ɲ], the *gn* in such words as *montagne*. Here the tendency is to substitute [nj] by making the point of contact too far forward. Thus *pignon* [piɲɔ̃] is pronounced like *opinion* [ɔpinjɔ̃]. This error can be avoided if the pupil is told to press the tip of the tongue against the lower teeth, and by a rapid movement raise the whole front portion of the tongue until it touches the palate somewhere about the centre. Here, again, a diagram is a great help.

The remaining consonants offer no special difficulty, it being remembered that plenty of voice should be produced in the case of v, z, ʒ, and the voiced consonants generally. This quality of French voiced consonants is apparent in cases of emphasis. An emphatic English *no* receives marked stress on the vowel, whereas in the Frenchman's *mais non* it is the extra length and voice of the *n* which supply the emphasis—*mais n—on*.

We have now considered, separately, all the sounds of spoken French; the class has been led to produce them fairly accurately, and has worked through oral exercises consisting of illustrative words, written in phonetic script, bearing upon each of these sounds. It now remains for the teacher to provide his pupils with further practice before introducing them to the conventional orthography. This can be done best by means of specially-constructed sentences, introducing the sound under consideration several times. For example, as an illustration of the vowel [e], the class may recite such sentences as this: "J'ai apporté les clefs du rez-de-chaussée," in which the sound occurs six times; as an example of [ɸ], "Les queues des bœufs étaient affreuses." In the case of consonants, both their initial and final force should be illustrated—for example: "Louise leur lit la lettre." "Les bulles volent sans ailes." These sentences should be written both in the ordinary orthography and in phonetic script, so that the sound and its conventional graphic representation may be compared. They will thus serve the purpose not only of phonetic drill, but also of a first introduction to orthography and orthoëpy. Later on these two subjects will be treated systematically, and the general principles involved thoroughly explained, but the concrete example should precede the general rule. The sentences may also be used for dictation. I would suggest the following method of procedure. A number of sentences having been prepared to illustrate a certain sound, the class should read them aloud from the phonetic script, mistakes in pronunciation being, of course, corrected, until the rendering is pretty accurate. Then let the same sentences be read again, this time from the ordinary orthography. When the pronunciation has been sufficiently practised, let them be dictated by the teacher, taken down by the class in phonetic script as an ear test, and finally transcribed into the ordinary orthography as an exercise in spelling. Such a method involves practice in pronunciation, in the discrimination of sounds or correct hearing in spelling, and in the use of the language itself.

There is one caution which must be given in connection with these sentences. If they are not carefully constructed, they are apt to induce a bad habit of misplacing the stress, a thing to be jealously guarded against. When we repeat a sentence in which the same sound recurs several times, we shall find that there is a tendency to emphasise those syllables which contain that sound. This is the natural effect of alliteration. Now, correct stress in French is difficult enough at all times for the English student to acquire. The influence of his own language, in which one syllable—and not always the same one—is strongly emphasised at the expense of the others which are slurred over and cut short, constantly militates against correct pronunciation of French. Here every syllable receives practically the same stress to an English ear, though really the last receives a little more than the others. Consequently care must be taken that the sound which is repeated in the sentence always falls either upon a monosyllable or the last-sounded syllable of a word. For example, in such a sentence as this: "Ce sénateur sauta sur son siège," the pupil is pretty sure to put a strong stress on the first syllable of "senateur" and "sauta." It is better to have fewer examples of the sound under consideration in any one sentence than to run the risk of this.

Having thus studied the nature and production of each of the sounds of French, and having sufficiently practised them first by means of isolated words and then in sentences, we come to the second part of our subject: How far is the pronunciation of a word a guide to its conventional spelling? and how far is its spelling a guide to its correct pronunciation? French spelling is far from being scientific, though it is far more so

than English. But there are many general principles involved with which it is essential that the student should be familiar. How can they best be taught? I hope to deal with this question in my next paper.

ESPERANTO.

BY ALEXANDER EASSON.

A FEW years ago some apology would have been due to our readers for the inclusion in these columns of an article on Esperanto. To-day the new language must be regarded as well within the domain of practical pedagogics, and worthy of the serious attention of the teaching profession. Nay, further, it demands attention, and ere long will enforce that demand. That Esperanto is a language and not a patent medicine we trust it is unnecessary to emphasise. But, in view of frequent misunderstandings, it is well at the outset to state that its advocates do not desire to supersede or replace any existing tongue, for Esperanto is merely intended as an auxiliary and secondary language to facilitate intercourse among the nations.

The invention of Dr. L. Ludovic Zamenhof, a native of Bielostok, a Russian town on the borders of Poland, Esperanto was first published in 1887. Volapük was then on its trial, and the new bantling made slow progress. In the course of two or three years the older rival succumbed, and many of its disappointed adherents, nothing daunted, transferred their allegiance to the younger claimant for the world's suffrages. They have received their reward.

Missionaries reached these islands towards the end of the nineteenth century, and were received with our well-known insular ridicule. They laugh best who laugh last. In November 1902 the first British society was founded, the honour of housing it falling to Keighley, Yorkshire. Prejudices gave way slowly but steadily, and now, in the beginning of 1907, seventy-three groups in the three kingdoms are affiliated with the British Esperanto Association, which is the union of all Esperanto societies throughout the Empire. Within its wide embrace rest groups so widely separate as Malta, Mysore, Christchurch, N.Z., and Winnipeg. Practically every month records the establishment of a new local group, and there are other evidences of the firm hold which the new language is taking in this country. In these circumstances it is most important that professional teachers should, without delay, make themselves acquainted with Esperanto, and be prepared to cope with the demand for competent instructors which has already arisen, and will in the near future steadily increase.

As has been said, Esperanto is an auxiliary language. It is not intended to usurp the place of any national language within its own territory. Indeed, its wide adoption will encourage the preservation of racial tongues. Its immediate purpose is to serve as a common medium of exchange among peoples who speak different languages. A knowledge of Esperanto will ere long, as it is hoped, supersede the necessity of acquiring a variety of foreign languages for the practical purposes of life—commerce, science, travel, and the like. But it does and must do more. Dr. Zamenhof's ideal is brotherhood and justice among the peoples, and Esperanto, in overcoming the great barriers which diverse languages interpose, is a fitting instrument for the realisation of such an aspiration.

The keynote of Esperanto as a language is simplicity, which implies regularity. There are few rules; these are easy to memorise, and they suffer no exceptions. The grammar and the mode of word-building are regular and logical throughout. Proof will be given anon by outlining the rules, after some notes as to the alphabet. This comprises five vowels—a, e, i, o, u, and twenty-three consonants—b, c, ĉ, d, f, g, ĝ, h, ĥ, j, ĵ, k, l, m, n, p, r, s, ŝ, t, ŭ, v, z. The letters, as may be seen, are of the familiar Roman type, six duplicates being distinguished by diacritical marks. The advantage claimed for these is that, by their means, roots have been selected in which the graphism harmonises with some languages, while the phonetism agrees with others; thus, ĝardeno (pronounced jar-day-no) = Eng. garden, Ger. garten, Fr. jardin, and Ital. giardino. The vowels receive what may be called the Continental sounds—namely, those given to the respective letters in the words far, there, marine, go, rude. The consonants have the same values as in English, with the following exceptions: c = ts, as in bits, Tsar; ĉ = ch, church; g is always hard, as in get; ĝ = j, jet; h is always aspirated; ĥ is the guttural ch heard in the Scotch loch or German ach—it occurs infrequently, and may generally be treated without confusion as a strong aspirate or as equivalent to k; j = y, yet; ĵ = zh, the medial sound in vision, measure; s has invariably the hard, sibilant sound in hiss; ŝ = sh, show; ŭ = w, woe—it is found only in the combinations aŭ (practically ow) and eŭ (eyo͞o). The pronunciation of all the letters is absolutely phonetic and invariable, no letter ever being silent. Two of the same vowel or consonant occurring together belong to different syllables, and must be pronounced separately. Thus, treege is a trisyllable. The accent falls on the penultimate syllable.

There is no indefinite article, and the definite article, la, is alike for all genders, cases, and numbers. All nouns in the nominative singular end in o, and form the plural by adding j. The objective or accusative is indicated by the addition of n to the nominative forms. Example: Patro, patroj, patron, patrojn. The adoption of a separate form for the accusative gives scope for greater flexibility of phrasing, without risk of ambiguity.

Adjectives end in a, and form the plural and the accusative in the same way as nouns. Example: Bona patro, bonajn patrojn. Adverbs, other than primary independent words, receive the termination e. Example: Bone = well; patre = paternally, as a father.

The grammatical terminations of the verb number twelve. These, added to the root or stem, form the various tenses, moods, and participles, as follows: Tenses—present, -as; past, -is; future, -os. Moods—conditional, -us; imperative, -u; infinitive, -i. Participles—present, past, and future active, -anta, -inta, -onta; passive, -ata, -ita, -ota. It will be noted that in the tenses and participles the letters a, i, and o are significant respectively of present, past, and future time. The participles take also substantival or adverbial endings. Example: Amanto = a lover; la Savinto = the Saviour; veturonto = one about to travel; li leginte..... = he having read..... The forms of the tenses and moods suffer no change in respect of person or number. Example: Mi estas = I am; li estas = he is; ŝi faras = she did; ni metos = we shall put; vi devus = you ought; ili atendu = let them wait. The passive voice

is formed by the verb esti = to be (the only auxiliary) and the necessary passive participle. Example: Mi estas amata = I am loved; li estis amata = he was loved; ŝi estas amita = she has been loved; ni estos amataj = we shall be loved; ili estos amitaj = they will have been loved. The compound tenses in the active voice are similarly formed, the active participles being substituted for the passive. As the language frowns upon all exceptions, there is no room in the grammar for that baneful section the irregular and defective verbs, for the simple and satisfactory reason there are none. Even the verb esti, "to be," falls into line. Teachers who have arduously mastered (?) the intricacies of irregular verbs in English, French, German, or Latin, and have since, with qualified enthusiasm, striven to bring their pupils to a similar state of perfection, cannot but rise to bless the inventor of such a labour-saving language. General Faidherbe, the noted French linguist and archæologist, is credited with the saying that it is the verb that hinders French colonization.

Such, briefly, are the outstanding features of the grammar. The rules are so few, so simple, and so intelligible that a good working acquaintance may be gained after but one hour's study. The vocabulary, similarly, is easy of acquisition. Seventy per cent. of the root words are known already to an educated Englishman. Their selection is not capricious, but carefully studied according to the degree of their internationality. Generally speaking, words already common to English, French, and German have a preference; then follow those common to any two of these languages; and failing any such agreement, recourse, as a rule, is had to Latin, as in one sense an international nursery of roots. Acquaintance with any foreign language—and most teachers have a knowledge of at least one—considerably reduces the slight task of memorising the vocabulary. It is still further lightened by the principle on which what are called "foreign" words—scientific terms and others already international—are incorporated. No change is made in these beyond their adaptation to the orthographical and grammatical rules of the languages. Examples are filozofio, geologio, teatro, statistiko, telefono.

The system of word-building by varying combinations of roots, prefixes, and suffixes is so fascinating as to be more of an intellectual pastime than a linguistic labour. Of the six prefixes, two may be mentioned: Ek, which denotes the beginning or short duration of an action; ekdormi = to fall asleep; ekbrili = to flash; ekveturi = to begin to travel, to start on a journey. Mal, perhaps the most important prefix, signifies the direct opposite of any idea—malamiko = an enemy; malriĉa = poor; malfermi = to open; malrapide = slowly. The suffixes number twenty-nine, some of which play a very important part: Ad denotes the continuance of an action—lernado = study; veturado = travelling; flugado = flight. Aĵ denotes a concrete idea, and ec abstract quality—ŝafaĵo = mutton, ŝafeco = sheepishness; amikaĵo = a friendly act; amikeco = friendship. Ar defines a collection, and er an item — mono = money; monaro = funds; monero = a coin; estro = a ruler; estraro = the magistracy; akvero = a drop of water; fajrero = a spark. Augmentation is indicated by eg, and diminution of degree by et—ĉambro = a room; ĉambrego = a hall; ĉambreto = a closet; egeco = intensity; eta = tiny. The ideas of locality, holder, and container are severally denoted by ej, ing, and uj—fotografejo = a photographic studio; fotografingo = a photo frame; fotografujo = a photo album; lernejo = a school; fingringo = a thimble; monujo = a purse. The two suffixes in greatest use are ig and iĝ, the former signifying causation, and the second conversion—sidi = to sit; sidigi = to seat, to cause to sit; sidiĝi = to become seated, to sit down. Membership is denoted by an, occupation by ist, leadership by estr, and character by ul—klubano = a clubmaster; Londonano = a Londoner; instruisto = a teacher; dentisto = a dentist; lernejestro = a schoolmaster; urbestro = a mayor; grandulo = a magnate; komenculo = one having a propensity for beginning things. The last suffix to be noticed is that which constitutes what a would-be wit is pleased to call the only gender in Esperanto, the feminine termination in—lernejanino = a schoolgirl; urbestrino = a mayoress; patrino = a mother; bovino = a cow; amatino = a sweetheart. When regard is had to the number and variety of English suffixes and prefixes expressive of one idea, the saving of mental exertion effected by having one word for one idea is obvious.

Dr. Zamenhof regards each root, prefix, suffix, and grammatical termination as a separate and distinct word, expressing a particular idea. A useful and important corollary is that all these appear in alphabetical order in the dictionaries of the language—a unique feature in lexicography. Combinations may be made of any two or more roots so far as logically possible. The suffix ec, with the substantival ending o = eco = a quality. The separative prefix dis, combined with the causative suffix ig and the verbal termination i = disigi, to separate. Primary words, such as some adverbs, prepositions, and conjunctions, may be used similarly to form compound words. Kunigi and kunulo, based on kun = with, mean respectively to unite and a companion. Per = by means of; peri = to intervene: the present participle of which, with the substantival ending, is peranto = a mediator. Negastama = inhospitable, is formed of ne = not, gast = guest, am = love, and a, the adjectival ending—literally, in English, unguestlovy. These few illustrations may suffice to show how the ingenious method of word-building and the small number of affixes together rid the vocabulary of a host of surplus and unnecessary words, and should compel the reader's acquiescence in the claim of simplicity. To this, and to directness of expression and facility of acquisition, the whole language, with its grammar, its system of word-building, and its choice of roots, tends. The rough places of natural languages have been made plain and the crooked straight.

The leading text-books are *The Standard Course of Esperanto*, by G. W. Bullen (Cassell's, second edition, 6d. and 1s.), containing Dr. Zamenhof's original exercises and a commercial vocabulary; *The Student's Text-Book*, by Dr. J. C. O'Connor, B.A. (*Review of Reviews* Office, 1s. 6d.), having two vocabularies—English-Esperanto and Esperanto-English; and, for advanced students, *Grammar and Commentary*, by Major-General George Cox, B.A. (British Esperanto Association, 2s. 6d.). A complete list of instruction books, dictionaries, and other publications may be had on application from the British Esperanto Association, 13 Arundel Street, Strand, London, W.C., which publishes an excellent monthly journal, the *British Esperantist*, price 3d. post free. The general literature includes translations of *Hamlet* (by Dr. Zamenhof), *The Tempest*, *Julius Cæsar*, *She Stoops to Conquer*, Byron's *Cain* and *Heaven and*

Earth, Dickens's *Christmas Carol*, plays by Molière and Schiller, and Bohemian, Polish, and Russian prose and poetry.

Besides the courses of instruction given by the various groups throughout the country, classes under the auspices of the Municipal Education Committees have been established in London ("Hugh Myddelton" School, Clerkenwell; Blackheath Road School, Greenwich; and Queen's Road School, Dalston), in Keighley, Yorkshire, and in Grimsby, Lincolnshire. The London Chamber of Commerce has also officially recognised the language, and last year held an examination, to which one hundred and thirty candidates entered. Diplomas are issued by the British Esperanto Association after examination, and as evidence of capacity for teaching nothing could be better than the possession of such a certificate. That interest in the language is steadily growing will be evident from the fact that during 1906 the number of group members in this country was more than doubled, and the sale of books quadrupled. In August the third International Congress of Esperantists will be held in Cambridge.

FRENCH PRIZE COMPETITION.

RULES.

1. All translations should be **posted not later than March 8, 1907**, and addressed:—PRIZE EDITOR, Office of *The Practical Teacher*, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should write pseudonym only on MS. Prize-winner will be asked to send name and address for publication.
4. No competitor may take the prize offered more than once in three months.

A Prize of Half a Guinea is offered for the best rendering into English of the following extract:—

Que des centaines de mille autres l'aient eue avant lui, cette idée ou cette vision, qu'importe au promeneur? Il l'a, lui, pour la première fois, et c'est tout comme s'il l'avait le premier. Il est trop évident que, devant le Colisée, des centaines de mille autres se sont dit avant lui, au moins dans leur for intérieur: "C'est grand, c'est colossal, c'est gigantesque, mais ce n'est pas beau!" Mais quand, pour la première fois, il se dit cela à lui-même, bien sincèrement et bien spontanément, il a comme une petite joie de la découverte. Il se rappelle l'Acropolis d'Athènes et son esprit s'amuse à comparer les deux génies et les deux arts. Athènes, c'est la cité, c'est-à-dire une individualité que le citoyen chérit plus que tout et qu'il veut rendre belle par-dessus toutes les autres cités. L'art parera cette ville d'une beauté individuelle qui la fasse distinguer de toutes les autres. Et il créera le Parthénon, le Temple de la Victoire aptère, l'Erechthéion. Rome, c'est le monde, c'est le monde à dominer, à écraser et à éblouir par la grandeur, la force, l'énormité du monument, non par la véritable beauté. La Ville n'est plus une personne qu'il faut parer pour la rendre admirée et enviée, c'est une puissance collective, une communauté universelle qui veut imposer aux vaincus l'écrasant temoignage de sa force et de sa grandeur. Il ne s'agit plus de séduire, de charmer ou de plaire, mais d'étonner le barbare par ce qui peut l'émouvoir, par le spectacle de la force, par le prestige de l'énorme. Et après les barbares d'autrefois, Rome prolonge cet effet sur les Yankees et autres barbares d'aujourd'hui. Or, s'il est vrai que toute œuvre d'art soit à la fois le témoignage historique d'une époque et le témoignage individuel d'un artiste, dans les monuments de l'Acropole l'individualité de l'architecte est fortement marquée, mais dans les monuments de Rome elle apparaît à peine, écrasée par la volonté de l'Empereur, qui commande, parce qu'il est l'incarnation divine de l'univers organisé et dominé par Rome.

From "Promenades dans le Passé,"
by GASPARD VALLETTE.

[Notes: *La Victoire aptère*, "wingless Victory." *L'Erechthéion*, "the Erechtheum."]

RESULT OF THE FEBRUARY COMPETITION.

The prize is awarded to "N. R. M." (Will "N. R. M." kindly forward name and address for publication?)

First Class.—I. W. T., T. V. D., Ternan, Lily, Caudebec, Ty Du, Abeille, Agonzag, D'Argent, Selmi, C. C. F., Myosotis, Nehemiah, Cœur-de-lion, G. C. O., Arran, Kettering, Ten, Phil, Lemuel Gulliver, Eve, Keeldees, Cornet, B. M. R., Rœma, Titlis, W. M. E., Colenso, Llanstadwell, Oakwood, Max, Lytton, Conor, Mollie, Topsy, Kerriensis, Carol, Winnowsty, Kitty, Caerfryddin, La Chaumière, M. O. S., Zuyder Zee, Meithrinva, Vich Ian Vohr, M. A. F., Juteux, P. A., Yllop, Myrtle, Mergy, E. S., Gladiator, Hodge, Janus, E. C. A., Treize Septembre, M. A. P., Ruthra, Milano, Gypsy, Via Latina, O. L. P. S., Mall.

Second Class.—Scotus, Beowulf, White Heather, La jeune fille, Japonica, Sophia, Spero, Prospero, Nestor, Sœur, E. He., Perseus, Bonne, Odd No., Margaret, Marius, Marie, Carn Brea, Conaville, Sellibister, Osmonda, Dax, Une rebelle, Valentine, Hiawatha, Snowdrop.

The name and address of "M. L. N.," the winner of last month's competition, are—Miss Mary L. Newman, Upton Farm, Poole.

Report.

The leading ideas in the piece set were well grasped, but some did not give a forcible enough rendering of *Que l'amant aimé marche sur elle*, and not a few did not grasp the fact that the questions commencing with *Elles n'accordent pas leurs actes toujours avec leurs idées?* are restatements in Mdlle. Bon's language of Josanne's arguments.

The Editor begs to thank "Uim Bog" for his kind letter.

Prize Translation.

"Man finds them (women) in front of him, as competitors and rivals, in the schools, in the hospitals, and in government offices; but round the fireside the old order is being restored. With all her heart and with all her feelings the aspirations of woman are towards the service of love. She has not the courage to be free; she has not the consciousness of her own worth; she has merely the desire and longing for love. If her beloved adorer should trample upon her, she would kiss his feet and say, 'Do it again.'"

Mademoiselle Bon listened to Josanne without protest. The young woman was becoming animated, almost aggressive.

"When married, they *cannot* free themselves from their husbands; when single, they *will not* free themselves from their lovers. They are slaves, as their mothers were, and as their daughters will be."

"They are women," said Mademoiselle Bon, with a smile. "They were born in a period of transition, and they are in revolt against a code of morality and laws to the constraint of which they are subjected. On all sides society limits the effect of their revolt.

"You say that their acts are not always consistent with their ideas?—In the same way do anarchists perform their military duty and pay taxes. You say that they have not lost their inborn liking for the service of love? Do not forget that century after century has moulded their natural feeling for obedience and sacrifice. You say that they love men who are unworthy of them?—Why! mistakes of the feelings will always be possible, in every age, in spite of all the evolutions of morality. In like manner the progress of hygiene and medicine will not prevent diseases. Do not sneer at women who have snapped their ancient fetters because they still trail the fragments behind them. You yourself, Josanne, are you not serving your apprenticeship to freedom? If you feel yourself a coward, do not discourage the others."

"N. R. M."

OUR SCIENCE SECTION

MATHEMATICS.

(STAGES 2 AND 3.)

BY FRANK CASTLE, M.I.M.E.

Trigonometrical Identities and Equations.—The trigonometrical ratios may be expressed in a variety of forms. These various forms are not only interesting, but are also frequently of great importance in reducing a given expression to a known or easily calculated form. As a simple example, given $\sin A = \frac{3}{5}$ to find tan A and cos A. We may express cos A and tan A in terms of sin A, and proceed to substitute the given value.

Thus $\cos A = \sqrt{1 - \sin^2 A} = \sqrt{1 - \frac{9}{25}} = \pm\frac{4}{5}$.

Similarly, $\tan A = \frac{\sin A}{\cos A} = \frac{\sin A}{\sqrt{1 - \sin^2 A}}$

$$= \frac{\frac{3}{5}}{\sqrt{1 - \frac{9}{25}}} = \frac{3}{4}.$$

In other forms of identities a trigonometrical expression in the form of an equation is given, and it is required to show that the expression on the left-hand side of the equation is equal to that on the right, or, conversely, that the right-hand side is equivalent to the left.

Ex. 1. (*a*) If A is an acute angle, show by means of a diagram—

(i) $\cos(90° - A) = \sin A$.

(ii) $\cos(90° + A) = -\sin A$.

(iii) $\tan(180° + A) = \tan A$.

(*b*) Show that

(i) $2(1 + \sin A)(1 + \cos A) = (1 + \sin A + \cos A)^2$.

(ii) $\tan^2 A - \tan^2 B = \frac{\cos^2 B - \cos^2 A}{\cos^2 A \cos^2 B}$. (1903.)

(*a*) The complementary and supplementary angles involved in (i), (ii), and (iii) are fully explained in all the books on the subject.

(*b*) (i) Multiplying out the factors on the left-hand side of the equation, then

$$2(1 + \cos A + \sin A + \sin A \cos A)$$
$$= 2 + 2\cos A + 2\sin A + 2\sin A \cos A,$$
$$\text{or, } \sin^2 A + 2\sin A \cos A + \cos^2 A + 2\sin A + 2\cos A$$
$$= (1 + \sin A + \cos A)^2.$$

(ii) $\tan^2 A - \tan^2 B = \frac{\sin^2 A}{\cos^2 A} - \frac{\sin^2 B}{\cos^2 B}$

$$= \frac{\sin^2 A \cos^2 B - \sin^2 B \cos^2 A}{\cos^2 A \cos^2 B},$$
$$\text{or, } \frac{(1 - \cos^2 A)\cos^2 B - (1 - \cos^2 B)\cos^2 A}{\cos^2 A \cos^2 B},$$
$$\therefore \frac{\cos^2 B - \cos^2 A \cos^2 B - \cos^2 A + \cos^2 A \cos^2 B}{\cos^2 A \cos^2 B},$$
$$\therefore \tan^2 A - \tan^2 B = \frac{\cos^2 B - \cos^2 A}{\cos^2 A \cos^2 B}.$$

Ex. 2. Prove the following relations:—

(*a*) $\sin(90° + A) = \cos A$.

(*b*) $\sec^2 A = 1 + \tan^2 A$.

(*c*) $(\sec A - \cos A)^2 = \tan^2 A - \sin^2 A$. (1901.)

(*a*) This may readily be proved by drawing an angle 90° + A. Or by using multiple angles thus—

$$\sin(90° + A) = \sin 90° \cos A + \cos 90° \sin A.$$

As $\sin 90° = 1$ and $\cos 90° = 0$, this becomes cos A.

$$\therefore \sin(90° + A) = \cos A.$$

(*b*) $\sec^2 A = \frac{1}{\cos^2 A} = \frac{\sin^2 A + \cos^2 A}{\cos^2 A} = 1 + \frac{\sin^2 A}{\cos^2 A}$.

$$\therefore \sec^2 A = 1 + \tan^2 A.$$

(*c*) $(\sec A - \cos A)^2 = \sec^2 A - 2\sec A \cos A + \cos^2 A$

$$= \sec^2 A - 2 + \cos^2 A,$$
$$\text{or, } 1 + \tan^2 A - 2 + \cos^2 A.$$
$$\therefore \tan^2 A - 1 + \cos^2 A$$
$$= \tan^2 A - (1 - \cos^2 A) = \tan^2 A - \sin^2 A.$$

Ex. 3. Establish the following identities:—

(*a*) $\sin^4 A + \cos^2 A = \cos^4 A + \sin^2 A$.

(*b*) $\sin^2 A \tan^2 A = \tan^2 A - \sin^2 A$.

(*c*) $\sin A \cos A = \frac{\tan A}{1 + \tan^2 A}$.

(*d*) $\frac{\cos^2 A - \sin^2 B}{\sin^2 A \sin^2 B} = \frac{1}{\tan^2 A \tan^2 B} - 1$. (1906.)

(*a*) $\sin^4 A + \cos^2 A = \sin^2 A(1 - \cos^2 A) + \cos^2 A$

$$= \sin^2 A - \sin^2 A \cos^2 A + \cos^2 A = 1 - \sin^2 A \cos^2 A$$
$$= 1 - (1 - \cos^2 A)\cos^2 A$$
$$= 1 - \cos^2 A + \cos^4 A = \sin^2 A + \cos^4 A.$$

(*b*) $\tan^2 A - \sin^2 A = \frac{\sin^2 A}{\cos^2 A} - \sin^2 A$

$$= \frac{\sin^2 A - \sin^2 A \cos^2 A}{\cos^2 A} = \frac{\sin^2 A(1 - \cos^2 A)}{\cos^2 A}$$
$$= \sin^2 A \times \frac{\sin^2 A}{\cos^2 A} = \sin^2 A \tan^2 A.$$

(*c*) $\frac{\tan A}{1 + \tan^2 A} = \frac{\tan A}{\sec^2 A} = \frac{\cos^2 A \sin A}{\cos A} = \sin A \cos A$.

(*d*) $\frac{1}{\tan^2 A \tan^2 B} - 1 = \frac{1 - \tan^2 A \tan^2 B}{\tan^2 A \tan^2 B}$

$$= \frac{\cos^2 A(1 - \sin^2 B) - \sin^2 A \sin^2 B}{\sin^2 A \sin^2 B},$$
$$\text{or, } \frac{\cos^2 A - \cos^2 A \sin^2 B - \sin^2 B(1 - \cos^2 A)}{\sin^2 A \sin^2 B}$$
$$= \frac{\cos^2 A - \sin^2 B}{\sin^2 A \sin^2 B}.$$

Trigonometrical Equations.—The process of solving a trigonometrical equation is similar in many respects to that of solving an algebraical equation. The chief difference is due to the fact that the variable or unknown quantity consists of an angle instead of a numerical or algebraical quantity. The methods adopted may be seen from the following examples.

Ex. 4. In the equation $\cos^2\theta - \sin^2\theta = 2 - 5\cos\theta$ find $\cos\theta$, and explain why one of the values of $\cos\theta$ given by the equation is impossible. Write down two values of θ that satisfy the equation. (1904.)

$$\cos^2\theta - \sin^2\theta = 2 - 5\cos\theta.$$
$$\therefore \cos^2\theta - (1 - \cos^2\theta) + 5\cos\theta = 2.$$
$$2\cos^2\theta + 5\cos\theta = 3.$$
$$\therefore \cos^2\theta + \frac{5}{2}\cos\theta + \left(\frac{5}{4}\right)^2 = \frac{3}{2} + \frac{25}{16} = \frac{49}{16}.$$
$$\therefore \cos\theta = -\frac{5}{4} \pm \frac{7}{4} = -3 \text{ or } \frac{1}{2}.$$

As the value of the cosine of an angle cannot exceed unity, the value −3 is obviously inadmissible.

Hence $\cos\theta = \frac{1}{2}$.

$$\therefore \theta = 60°, 300°, \text{ etc.}$$

Ex. 5. (*a*) Show that $\sin^2 A + \cos^2 A = 1$.

(*b*) $\sin A = \frac{\tan A}{\sqrt{(1 + \tan^2 A)}}$.

(*c*) Find a value of θ which satisfies the equation

$$\sin\theta + 2\cos\pi + 4\tan\frac{\pi}{4} = 1.$$

(*b*) $\sin A = \frac{1}{\operatorname{cosec} A} = \frac{1}{\sqrt{(\cot^2 A + 1)}}$

$$= \frac{1}{\sqrt{\left(\frac{1}{\tan^2 A} + 1\right)}} = \frac{\tan A}{\sqrt{(1 + \tan^2 A)}}.$$

(*c*) $\sin\theta + 2\cos 180° + 4\tan 45° = 1$,

or, $\sin\theta - 2 + 4 = 1$.

$\therefore \sin\theta = -1$.

Hence a value of θ is 270°.

Ex. 6. If $\cos 41° 24' 34{\cdot}6'' = \frac{3}{4}$, find an angle θ which satisfies the equation

$$4\cos 2\theta + 3 = 0.$$

As $4\cos 2\theta = -3$,

$\therefore \cos 2\theta = -\frac{3}{4}$.

Or, $2\theta = 180° - 41° 24' 34{\cdot}6'' = 138° 35' 25{\cdot}4''$.

$\therefore \theta = 69° 17' 42{\cdot}7''$.

Ex. 7. Define the sine, cosine, and tangent of an angle less than a right angle. (1904.)

Ex. 8. (*a*) Calculate the angle less than a right angle whose cosine equals $\frac{3}{5}$.

(*b*) Find all the positive values of θ less than four right angles which satisfy the equation $3\cos\theta + 2 = 0$. (1898.)

Ans. (*a*) 48° 11' 23".

Ex. 9. Find the positive values of A, less than four right angles, for which $2\sin A = \tan A$. (1902.)

Ans. 0°, 60°, 180°, 300°.

Ex. 10. Show by means of a diagram that

(i) $\tan 60° = 3\tan 30°$.

(ii) $\tan A + \cot A = \sec A \operatorname{cosec} A$.

(iii) Extract the square root of $1 + 2\sin A\cos A$. (1902.)

Ans. (iii) $\pm(\cos A + \sin A)$.

Ex. 11. Reduce to its simplest form

$$\frac{\cos(180° - A)\sin(360° - A)\cot(90° + A)}{\tan(180° + A)\cos(-A)\tan(90° - A)}.$$ (1904.)

Ans. $-\frac{\sin^2 A}{\cot A}$.

Ex. 12. (*a*) Show how to construct an angle whose tangent is 1·5, and calculate the numerical values of the sine and cosine of that angle. ($\sqrt{13} = 3{\cdot}606$.)

(*b*) Find the eight positive values of θ, less than 360°, which satisfy the equation $2\sin 4\theta = \sqrt{2}$. (1899.)

Ans. (*b*) 11° 15', 33° 45', . . . 281° 15', 303° 45'.

PHYSIOGRAPHY.

(STAGES 2 AND 3.)

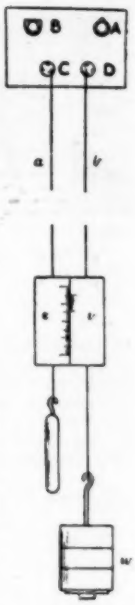
ELASTICITY.

HAVING learned what is meant by the *coefficient of elasticity* of a substance, we will now consider the practical details for determining the coefficient of elasticity of a wire.

We take two wires several metres in length and attach them to a metal plate, as shown in the Figure. This plate is hung from two hooks fastened into a beam in the ceiling, or some other suitable support.

This plate is best arranged so that it rests by means of a V fitting A on one hook, and a plane fitting B on the other hook. This ensures the plate always resting properly on both hooks. The two wires are clamped to the plate by the thumbscrews D and C. One wire—say the one on the left labelled *a*—is stretched by a constant load *d* to keep it straight, and carries a millimetre scale *e* near its lower end. The other wire *b* is stretched by a variable load, consisting of a rod and a number of slotted weights *w*. It also carries a vernier *v* attached to it by means of a thumbscrew at the back, so that the point of attachment and the zero of the vernier scale are both in the same horizontal plane. The object of having two wires hanging from the same support instead of having one wire only is this: when the wire which is to be stretched is loaded, the support is liable to move a little; and if we recorded only the movement of the vernier *v*, any motion of the support would introduce an error. As the total motion of the vernier in many cases is not more than about 5 mm., if the beam from which the wire is supported were to move 1 mm. this would introduce an error of twenty per cent. into the measurement. Hanging the scale *e* by means of the wire *a* from the same support, however, obviates any error from this cause, for if the support moves it affects the positions of the scale and vernier equally.

We will now take the figures of an actual experiment. With a mass of 4 kilograms on the wire *b*, the zero point of the vernier was arranged so that its distance from the point C was 300 cms. The vernier read to one-tenth of a millimetre, and its reading was ·74 cms. on the scale *e*. On adding two kilograms, the reading became ·86 cms. Increasing the load by increments of two kilograms each time, the following readings were obtained:—



Load in kilograms.	Vernier readings. cms.
4	·74
6	·86
8	·96
10	1·05
12	1·16
14	1·24
16	1·35
18	1·45
20	1·55

It will be seen that equal increments in the load did not give exactly equal changes in the vernier readings. This was no doubt partly due to the wire *b* not being perfectly straight to start with, and partly due to the vernier not reading to a smaller change than one-tenth of a millimetre.

On taking the weights off again, two kilograms at a time, it was found that the readings then obtained were much more regular; but the vernier did not come back exactly to the position from which it started, due, no doubt, to the wire having been straightened, for on repeating the experiment the readings corresponded to those obtained on taking off the weights.

It will be seen that the figures obtained are in accordance with Hook's law, for the amount of stretching is proportional to the force applied.

Load in kilograms.	Vernier readings. cms.
20	1·55
18	1·45
16	1·35
14	1·25
12	1·15
10	1·05
8	·95
6	·85
4	·75

The total elongation produced by an increase in the load from 4 to 20 kilos, or 16 kilos, was ·8 cms. The original length was 300 cms., so that the strain was $\frac{\cdot 8}{300}$. To calculate the stress, we must calculate the increment in the force per square centimetre which was required to produce this strain. To find this, the area of cross-section of the wire was required. This was found by measuring the diameter by means of the micrometer gauge. The diameter was exactly 1 mm., and the area of cross-section πr^2 was equal to $\cdot 05 \times \cdot 05 \times 3{\cdot}1416$ square centimetres. The force due to 16 kilograms, or 16,000 grams, was 16000×981 dynes, and therefore the force per square centimetre of cross-section, or the stress, was—

$$\frac{16000 \times 981}{\cdot 05 \times \cdot 05 \times 3{\cdot}1416}.$$

The coefficient of elasticity was therefore given by the equation—

$$E = \frac{\text{stress}}{\text{strain}} = \frac{16000 \times 981}{\cdot 05 \times \cdot 05 \times 3{\cdot}1416} \div \frac{\cdot 8}{300}$$

$$= \frac{16000 \times 981 \times 300}{\cdot 05 \times \cdot 05 \times 3{\cdot}1416 \times \cdot 8}$$

$$= 750{,}000{,}000{,}000 \text{ dynes approximately}$$

$$= 7{\cdot}5 \times 10^{11} \text{ dynes.}$$

An alternative method of determining the area of cross-section of the wire is to weigh a measured length of the wire in air and in water, and determine its density. The volume of the wire is its mass divided by its density. Its volume is also its length multiplied by its area of cross-section. Therefore we can get the area of cross-section from the equation—

$$a = \frac{m}{d \times L},$$

where *a* is the area of cross-section, *m* is its mass obtained by weighing, *d* its density, and L its length.

CHEMISTRY.

(ADVANCED AND HONOURS.)

BY C. A. WEST, B.SC., A.R.C.S., F.I.C.

Phosphorus Subiodide and the Rôle of this Substance in the Allotropic Transformation of Phosphorus.—When dry iodine is added to a solution of phosphorus in dry carbon disulphide in quantity less than is necessary to convert the phosphorus into the di-iodide, and the mixture is exposed to sunlight, phosphorus subiodide, P_4I, separates. This is an amorphous, red powder; it decomposes without melting, forming phosphorus di-iodide (which dissociates) and phosphorus vapour, and is only slowly attacked by water. Dilute nitric acid attacks the subiodide vigorously, liberating iodine, and with concentrated nitric acid it inflames. Concentrated solutions of the alkali hydroxides dissolve it, liberating hydrogen phosphide, and dilute solutions of the alkali hydroxides or carbonates convert it into "Leverrier's suboxide," P_4OH.

Phosphorus subiodide dissolves in solutions of iodine, forming phosphorus di-iodide or tri-iodide. This reaction serves to distinguish it from red phosphorus.

The catalytic conversion of yellow into red phosphorus by the agency of iodine is explained by assuming that phosphorus di-iodide is first formed, and this, in contact with excess of phosphorus, is converted into phosphorus subiodide, which, at temperatures above 160°, undergoes a series of decompositions resulting in the formation of phosphorus di-iodide, which immediately dissociates, and red phosphorus. This explanation of the allotropic transformation is similar to that proposed by Brodie, and regarded as unacceptable by Hittorf.

Influence of Water Vapour on the Reduction of Carbon Dioxide by Carbon.—"Dry" and "moist" carbon dioxide have been passed over purified wood charcoal contained in a porcelain tube, heated at temperatures varying from 650° to 1000°. At 800°, the reduction of carbon dioxide took place more rapidly in the moist than in the dry mixture; but the difference rapidly disappeared as the temperature was increased, and at 1000° the rapidity of action was the same whether the gas was dry or moist. The rate at which the current of gas was passed had little influence on the action. These observations indicate that the greater rapidity of reaction which attends the use of dry air in the blast furnace is the direct result of the difference in hygrometric state, and is not due to the dryness of the air favouring the formation of carbon monoxide.

Magnalium and other Light Alloys.—Magnalium, which is the name given to an alloy of aluminium with magnesium, is manufactured in three varieties—X, Y, and Z. The alloy has a greater tendency to oxidation when hot than aluminium; but its advantages over that metal are its much greater tensile strength, and the fact that it is much better adapted to turning, etc. The following analyses were obtained from various samples, most of the aluminium hydroxide being removed by digestion with sodium hydroxide before proceeding to the separation of the other metals. Alloy X contains copper 1·76, magnesium 1·60, nickel 1·16 per cent., and antimony and iron in smaller quantities. Alloy Y, which appears to be intermediate in composition between X and Z, except as regards nickel, contains copper, magnesium, tin, lead, a small amount of iron, and a doubtful trace of antimony. Alloy Z (soft sheet) contains tin 3·15, copper 0·21, magnesium 1·58, lead 0·72 per cent., and about 0·3 per cent. of iron. Zisium, sp. gr. 2·95, and ziskon, sp. gr. 3·35, are two silver-white alloys, which are used in scientific instrument making. Zisium is essentially aluminium, with small amounts of zinc, tin, copper, and traces of antimony and bismuth. Ziskon is a zinc aluminium alloy, containing 25 per cent. of the former metal.

Non-existence of Arsenic Pentachloride.—In the *Journal* of the American Chemical Society, Warren Rufus Smith and Joseph E. Hora describe their experiments on the so-called pentachloride of arsenic. By the action of chlorine on arsenic trichloride at −34°, Baskerville and Bennett obtained a substance which they assumed to be arsenic pentachloride. It has been found that the freezing-point of a solution of chlorine in arsenic trichloride, in which As : Cl = 1 : 3, is −16·2°, and that the freezing-point falls regularly as the proportion of chlorine increases, that of a solution in which As : Cl = 1 : 9 being −59·5°. When a solution containing molecular proportions of chlorine and arsenic trichloride is cooled, solid begins to separate at −48°; but the substance does not solidify completely, some liquid still remaining at −70°. The solid substance which separates seems in every case to be arsenic trichloride. It is therefore concluded that arsenic pentachloride is not formed under these conditions, and that the product described by Baskerville and Bennett was merely a solution of chlorine in arsenic trichloride.

Mechanical Properties of Iron in Isolated Crystals.—A number of nearly pure iron crystals, some of which measured several c.c. in volume, have been isolated from a portion of a steel rail, and subjected to tension, compression, hardness, and bending tests. The results show that the mechanical properties of isolated crystals of iron are a function of the crystallographic orientation in its relation to the direction in which the stress is applied. The material is very brittle in the directions of the planes of cleavage, but shows great plasticity in other directions.

Bismuth-aluminium and Magnesium-aluminium Alloys.—Attempts to prepare alloys containing less than 70 per cent. of aluminium have been unsuccessful, the resulting ingot consisting of three layers, the lower one being heterogeneous, and containing bismuth in excess, the middle one being an alloy containing about 70 per cent. of aluminium, whilst the upper one was a homogeneous alloy containing about 90 per cent. of aluminium. Alloys containing 75, 85, 88, and 94 per cent. of aluminium, with the sp. gr. of 2·857, 2·79, 2·776, and 2·74 at 20° respectively, have melting-points intermediate between those of the two component metals. They are sonorous, brittle, and have a beautiful silvery-white colour. They are stable in dry or moist air, readily attacked by concentrated or dilute acids, hot or cold, and by potassium hydroxide in the cold, and decompose distilled water at 18° or 95° into hydrogen and oxygen, the bismuth becoming slightly oxidised. This reaction is probably due to a thermo-chemical action induced by the unequal heating of the two metals in the process of filing.

Magnesium-aluminium Alloys.—Alloys containing 66, 68, 73, 77, and 85 per cent. of aluminium, with the sp. gr. of 2·244, 2·275, 2·324, 2·373, and 2·474 at 21° respectively, have melting-points not far removed from that of aluminium, are brittle, have a beautiful silvery-white colour, and are capable of taking a good polish. They are stable in the air at the ordinary temperature, but burn readily at a red heat; are readily attacked by concentrated or dilute acids, hot or cold, with the exception of the alloys, containing 85, 77, and 73 per cent. of aluminium, which are not attacked by dilute sulphuric acid; and are readily attacked by potassium hydroxide solution in the cold. Hydrogen peroxide is decomposed by these alloys, the magnesium suffering oxidation, and they decompose water.

NOTES ON PHYSICS.

BY EDWIN EDSER, A.R.C.SC.

Simple Harmonic Motion.—If a body moves in such a manner that it periodically passes and repasses all points in its path in a similar manner, the motion of the body is said to be *periodic*. Thus the motion of the earth around the sun and the rotation of the earth on its axis are examples of periodic motion. The time which elapses between two passages in the same direction through any given point is called the *period* of the motion.

There is one kind of periodic motion which is of the greatest importance—firstly, because it frequently occurs in nature; and secondly, because it can be investigated analytically without the use of difficult mathematics. This type of periodic motion is called *simple harmonic motion*, and is defined as follows:—

Let a point P (Fig. 1) move with uniform velocity around

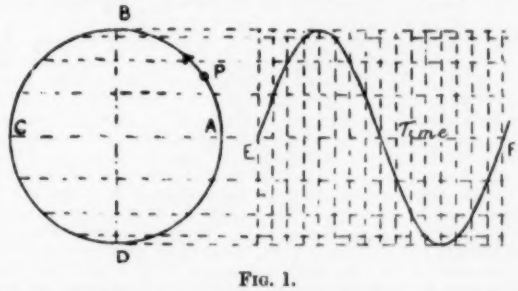


FIG. 1.

the circle ABCD, completing each revolution in T seconds. The distance of the point from the diameter AC is continually changing. As the point P moves from A to B it recedes from AC; from B to C it approaches AC, and passes through this line at C; from C to D it again recedes from AC, but in the opposite direction to that previously taken; and from D to A it approaches AC, and passes through this line at A, when the above cycle of

changes recommences. The curve to the right of Fig. 1 shows how the distance of the point from AC varies during a complete period. Starting from E, the line CA produced is divided into a number of equal parts, each part between E and F representing a certain fraction of the periodic time; and from the dividing points perpendiculars are erected. The circle ABCD is divided into the same number of equal parts as the line EF. Then the dividing points on the circle ABCD are numbered 0, 1, 2, 3, 4, . ., commencing with 0 at A. The feet of the verticals between E and F are also numbered 0, 1, 2, 3, 4, . . ., commencing with 0 at E. Horizontal lines are drawn through the various points on the circle ABCD, each horizontal being denoted by the number of the point from which it starts. Then the point where "horizontal 1" cuts "vertical 1," and that where "horizontal 2" cuts "vertical 2," and so on, are marked, and the points thus found are joined by a continuous curve. This curve is called a simple harmonic curve. It gives the distance of the point P from the horizontal diameter AC at each instant in a complete period.

The greatest distance to which the point P recedes from the axis AC is equal to the radius of the circle ABCD. This is also equal to the distance from the straight line EF to a crest or a trough of the wave-like harmonic curve, and is called the *amplitude* of the simple harmonic motion.

The nature of a simple harmonic motion can be understood by imagining that we are looking from a distant point beyond F along the straight line FC; then, as the point P moves round the circle ABCD, it will appear to move to and fro across the line AC. The distance through which it appears to move on either side of AC is the amplitude of the motion, and the time between two passages of the point *in the same direction* through AC is the period of the motion.

As the point P moves through B or D, the direction of its motion is for an instant parallel to AC—that is, at these instants it is neither receding from nor approaching toward AC, so that its velocity perpendicular to AC is equal to zero. Hence *at either extremity of a simple harmonic vibration the velocity is for an instant equal to zero.*

As the point P moves through A or C, the direction of its motion is for an instant perpendicular to AC—that is, at these instants the velocity of P perpendicular to AC has its greatest numerical value. Let the amplitude of the vibration be equal to a; then a is the radius of the circle ABCD; and since the point P traverses the circular path ABCD, equal in length to $2\pi a$, in a time equal to T seconds, it follows that the velocity of the point P is equal to $(2\pi a/T)$. Hence *at the mid-point of a simple harmonic vibration, the velocity is for an instant equal to* $(2\pi a/T)$.

Let a body of mass m be vibrating harmonically. Then, as it passes through the mid-point of its motion, its velocity is $(2\pi a/T)$, and therefore its kinetic energy, which is equal to the product of half the mass into the square of the velocity, is equal to

$$\tfrac{1}{2}m\left(\frac{2\pi a}{T}\right)^2.$$

This result determines the conditions that must be complied with in order that a body shall vibrate harmonically. At the extremity of a vibration the body is for an instant stationary, so that at this instant it can possess no kinetic energy, the whole of its energy being therefore energy of position, or potential energy. As the body moves towards its mid-point its energy changes from the potential to the kinetic form, this change being completed as the mid-point is reached. As the body moves from its mid-point to the opposite extremity of its vibration its energy is changed from the kinetic to the potential form, this change being completed as the extremity is reached. Now the potential energy at the extremity of a vibration is equal to the work done in moving the body from the mid-point to the extremity of a vibration—that is, through a distance a; and as the kinetic energy at the mid-point, $\frac{1}{2}m\,(2\pi a/T)^2$, is equal to the potential energy at the extremity of a vibration, it follows that the work done in displacing the body through a distance a is proportional to a^2, so that the average force overcome through the distance a is proportional to a. Hence *the force pulling the body toward the mid-point of its vibration is proportional to the displacement of the body from that point.* This is the condition which must be complied with in order that a body may perform a simple harmonic vibration.

EXAMPLE.—*Vibration of a simple pendulum.* A simple pendulum consists of a heavy mass of small dimensions hung from a fixed point by a fibre which is perfectly flexible, and of so little mass that it may be considered to be massless. If the pendulum were in equilibrium, it would hang vertically downwards, the centre of the mass (called the "bob") being directly beneath the point of attachment of the fibre. If the pendulum is displaced from this position and then released, it swings to and fro across its position of equilibrium. In doing so it alternately rises a small distance against the force of gravity (so gaining potential energy), and descends towards its position of equilibrium (so losing potential energy and gaining kinetic energy). In all cases its motion will be periodic. When the arc through which it swings is small, the vibrations will also be of the simple harmonic type, and the time of vibration will be the same whatever may be the actual amplitude of the small vibration. This is proved as follows:—

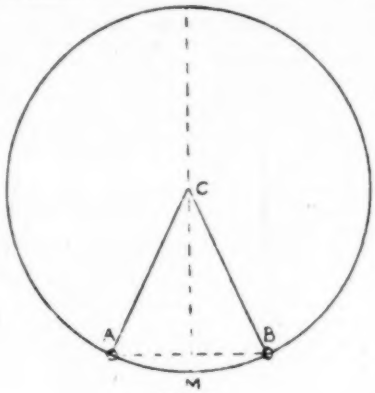


FIG. 2.

Let AB (Fig. 2) be the extremities of the vibration of the pendulum bob, which hangs from C by means of a massless fibre of length $CA = CB = l$. With C as centre, describe a circle of radius equal to l; and through M, the mid-point of the vibration, draw a diameter to this circle. Join A and B by a straight line; then the distance from M to the point where AB cuts MC is the distance (say h) through which the bob is raised against the force of gravity, and the work done in displacing the bob from M to A or B is therefore mgh. The amplitude a of the vibration is equal to $MA = MB$; and when a is small in comparison with l, half the distance between A and B, measured in a straight line, will differ only infinitesimally from a. Then, by a well-known property of the circle,

$$a^2 = (2l - h)h = 2lh,$$

when h is so small that h^2 can be neglected. In these circumstances,

$$h = \frac{a^2}{2l},$$

and potential energy at end of swing = work done against gravity between M and A or B

$$= mgh = \frac{m}{2} \cdot \frac{g}{l} \cdot a^2.$$

Thus the potential energy at the end of a swing is proportional to a^2, and the vibration will be of the simple harmonic type. Let the time of a complete (to and fro) swing be T; then the period of the simple harmonic vibration is T, and the velocity of the bob at the mid-point of its swing is $(2\pi a/T)$, so that its kinetic energy there is equal to

$$\tfrac{1}{2} \cdot m\left(\frac{2\pi a}{T}\right)^2.$$

Equating the kinetic energy at the mid-point of a swing to the potential energy at the extremity of a swing, we have

$$\frac{m}{2} \cdot \left(\frac{2\pi}{T}\right)^2 a^2 = \frac{m}{2} \cdot \frac{g}{l} \cdot a^2.$$

We can now cancel m out, which shows that *the time of swing is independent of the mass of the bob.* We can also cancel a^2 out, which shows that *the time of swing is independent of the amplitude,* so long as this is small. Finally,

$$\left(\frac{2\pi}{T}\right)^2 = \frac{g}{l}.$$

$$\therefore T = 2\pi\sqrt{\frac{l}{g}}.$$

The vibration of a compound pendulum will be considered in the next article of this series.

OUR TUTORIAL SECTION

SCHOLARSHIP COURSE FOR 1906-7.

BY ARTHUR T. FLUX,

Late Principal of the Belvedere Pupil-Teacher Centre; First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.

Work for the Month.

PART II.

1. *English Grammar and Literature.*—This month will naturally be spent in revision of the work that has been done during the past eighteen months. In a subject with such a wide scope, it is somewhat difficult to select points which deserve more attention than others. The best method of testing one's knowledge is by going through collections of questions on the subject, of which a supply is found in most of the best text-books. A few questions are given below which may assist in calling attention to any weak points. Finish Abbott and Seeley. The last section on the simple laws of classification and reasoning is most valuable, and should on no account be neglected.

The errors given last month for correction have puzzled a few students, and I give the corrections.

(1.) "He parts his hair in the centre." *Centre* should be *middle*. The centre is a point, and not a line.

(2.) "He laid down." Should be *lay*. The confusion between the intransitive *lie* and the transitive *lay* is very common. Note the three verbs "to lie" (tell an untruth), I lie, I lied, I have lied; "to lie" (to recline), I lie, I lay, I have lain; "to lay," I lay, I laid, I have laid.

(3.) "Sorrow not as them that have no hope." Sorrow not as they (sorrow) that have no hope.

(4.) "They summonsed him," etc. Should be *summoned*.

(5.) "The fairest of her daughters, Eve." Eve could not be the fairest of her daughters. Say, "Fairer than any of her daughters."

(6.) "To quickly close." To close quickly; an example of the split infinitive.

(7.) "*Between*" signifies exactly between *two*. Use *among* for larger numbers.

(8.) "*Walking*" is a floating participle—that is, there is no noun in the sentence to which it can relate.

(9.) "*Thou*" should be *thee*, as it is the accusative case to "arraign."

(10.) "Peeps in" should be "peeps into."

(11.) "Cometh" should be *comes*. Violation of law of syntax.

(12.) "The Thames" is not derived from the Latin, but from the springs at Thames head. The word "Thames" is so derived.

REVISION QUESTIONS FROM RECENT EXAMINATION PAPERS.

(1.) Explain the meaning of each of these terms, and make sentences containing illustrations of their use—infinitive of purpose, co-ordinate, apposition, antithesis, demonstrative, ellipses.

(2.) Comment on the uses of the word *but* in the following sentences:—

(*a*) There is no man *but* honours you.
(*b*) *But* yesterday the word of Cæsar might have stood against the world.
(*c*) He came, *but* did not remain long.
(*d*) Life has passed with me *but* roughly.
(*e*) No tongue *but* Hubert's.
(*f*) *But* me no *buts!*

(3.) Quote from any poem you know examples of simile, metaphor, and personification.

(4.) Explain by derivation the meaning of eight of the following, and put each in an appropriate sentence—telephone, tripartite, omniscient, innumerable, recompense, philosopher, quadrilateral, comprehension, simulate, illicit, legislate.

(5.) Give examples of any words formerly used in English which are now rarely or never used.

(6.) Who were the authors of the following passages, and in which of their works do they occur?—

(*a*) One crowded hour of glorious life
Is worth an age without a name.
(*b*) But trailing clouds of glory do we come
From God, who is our home.
(*c*) He prayeth best who loveth best.
(*d*) The paths of glory lead but to the grave.
(*e*) Storied windows richly dight
Casting a dim, religious light.
(*f*) God fulfils Himself in many ways
Lest one good custom should corrupt the world.

(7.) Comment on the history of these words—gossip, villain, poison, spinster, exchequer, mesmerise.

(8.) Sketch briefly the plot of any play of Shakespeare's not directly connected with English history, *or* of one of Scott's novels.

(9.) Who wrote the following, and state approximately when he lived?—

(*a*) 'Tis better to have loved and lost
Than never to have loved at all.
(*b*) That last infirmity of noble minds.
(*c*) Then none was for a party,
Then all were for the state.
(*d*) How sublime a thing it is
To suffer and be strong.
(*e*) Hoist with his own petard.
(*f*) The shrieks of death through Berkeley's roof that ring,
Shrieks of an agonising king.

(10.) "But little do men perceive what solitude is, and how far it extendeth; for a crowd is not company, and faces are but a gallery of pictures, and talk is but a tinkling cymbal where there is no love."—BACON. Expand the ideas in this extract to about ten lines. What difference in expression from current literature of the present day do you notice? What quotation does the passage contain, and whence was it taken?

(11.) Complete the following quotations, and give the book and author:—

(*a*) A daughter of the gods, divinely tall.....
(*b*) One touch of nature.....
(*c*) There was a sound of revelry.....
(*d*) Absence of occupation is not rest.....
(*e*) Cowards die many times before their death.....
(*f*) If thou wouldst view fair Melrose aright.....

(12.) What figures of speech appear in the following?—

(*a*) The crown would not yield to the minister.
(*b*) For Brutus is an honourable man.
(*c*) They were swifter than eagles and stronger than lions.
(*d*) O death! where is thy sting?
(*e*) The minister was a pillar of the state.
(*f*) The kettle boils.

Give one other illustration of each.

(13.) What is the difference in meaning between aid and help, discover and invent, liberty and freedom, imagination and fancy, habit and custom?

(14.) Express each of the following by means of one word:—

(*a*) A cure for all ills.
(*b*) Writing by means of pictures.
(*c*) A ship abandoned in mid-ocean.
(*d*) An instrument for signalling by reflecting the sun's rays.
(*e*) A belt for carrying cartridges.
(*f*) Something which moves by concealed machinery.
(*g*) The disposal of dead bodies by fire.
(*h*) One skilled in estimating the value of artistic work.

(15.) In what books do the following characters appear—Miss Trotwood, Maggie Tulliver, Rosalind, Torfrida, Wamba, Savonarola, Legree, the Mad Hatter.

Write an essay or two each week, selecting from the following:—

(*a*) The value of reading historical novels.
(*b*) The blessings of hope.
(*c*) The fairest action of our human life
Is scorning to revenge an injury.
(*d*) Hobbies.

2. *History.*—A general revision will be necessary. Notebooks,

if they have been properly kept, will be of great use. The following points amongst others should be carefully revised :—

(1.) Genealogical tables, showing the exact descent of each dynasty.

(2.) Growth of the constitution—Witanagemote, Magnum Concilium, Curia Regis, House of Commons, Bill of Rights, Reform Bills, etc.

(3.) Battles (with plans of the chief)—for example, Aylesford, Mount Badon, Heathfield, Ellandune, Hengest's Down, Ashdown, Ethandune, Brunanburg, Stamford Bridge, Hastings, Gerberoi, Alnwick, Tenchebrai, of the Standard, Lincoln, Bouvines, Fair of Lincoln, Lewes, Evesham, Cambuskenneth, Falkirk, Bannockburn, Boroughbridge, Sluys, Crécy, Neville's Cross, Poitiers, Navaretta, Radcot Bridge, Homildon Hill, Shrewsbury, Bramham Moor, Agincourt, of Herrings, of the Wars of the Roses, Stoke, Guinegate (Battle of the Spurs), Flodden, Halidon Hill, Solway Moss, Pinkie Cleugh, Langside, Zutphen, of the Civil War (1642–9), Dunbar, North Foreland, Southwold, Sedgemoor, Killiecrankie, Steinkirk, Landen, Namur, La Hogue, Blenheim, Ramillies, Oudenarde, Malplaquet, Sheriffmuir, Prestonpans, Culloden, Minden, Plassey, Lagos, Quiberon Bay, Lexington, Bunker Hill, Saratoga, of the Saints (Rodney, in 1782), St. Vincent, Camperdown, Vinegar Hill, of the Nile, Trafalgar, Copenhagen, Roliça, Vimiera, Talavera, Busaco, Albuera, Salamanca, Vittoria, Orthes, Toulouse, Ligny, Quatre Bras, Waterloo, etc.

(4.) Treaties and Peaces—Aix-la-Chapelle, Amiens, Breda, Bretigny, Chateau-Cambresis, Fontainebleau, Ghent, Northampton, Ryswick, Utrecht, Wedmore, Troyes, Berwick, Brigham, Dover, Estaples, Mise of Lewes, Paris, Pecquigny, Versailles, Wallingford.

(5.) Chief men, including Aidan, André, Anselm, Anson, Atterbury, Bede, Blake, Bonner, Byng, Cade, Cecil, Chaucer, Cobden, Columba, Coverdale, Cranmer, Danby, De Burgh, De Montfort, Des Roches, Despensers, Dunstan, Dupleix, Eliot, Eustace of Boulogne, Sir Thomas Fairfax, Flambard, Frobisher, Gardiner, Gilbert, Grosseteste, Hampden, Havelock, Hereward, Hooper, Rowland Hill, Walter Hubert, Hyde, Jeffreys, Kett, Langton, Longsword, Luther, William Marshall (Earl of Pembroke), Montrose, More, Morton, Neville (Earl of Warwick), Newton, Oates, O'Connell, Oldcastle, Outram, Peter the Hermit, Gaveston, Porteous, Pym, Ridley, Prince Rupert, Sacheverell, Algernon Sidney, Strafford, Sidney, Washington, Wolfe, Wolsey, William of Wykeham.

(6.) Causes and results of rebellions and conspiracies—for example, Argyle's, Babington's, Cade's, Gordon's, Gunpowder, Kett's, Mar's, Monmouth's, Young Pretender's, Percies', Pilgrimage of Grace, Simnel's, Simon de Montfort's, Tyler's, Wyatt's.

(7.) Chief statutes passed, and their terms.

Notes.—England and the Continent.

It is impossible to obtain a proper appreciation of the history of any country without following the fortunes of other countries intimately connected with it, since they affect, and very often seriously affect, home affairs. Going back to earliest history, the invasion of Julius Cæsar must be regarded as an event in the expansion of the Roman Empire. Cæsar had been appointed to the supreme command in Gaul, and had fought his way northward, subduing the various tribes, till he came to the Belgæ, who made a stout defence, and were aided by warriors from Britain. To avenge himself for their opposition, to extend his conquests, to satisfy his curiosity, Cæsar crossed the strait, and exacted a semi-submission from some of the tribes in the south of the island. The internal affairs of Rome prevented any further action for nearly a century, when the real conquest began. The policy of the Romans was to conquer states and hold them as tributaries, interfering as little as possible with the mode of life, but demanding a yearly tribute, which went to swell the wealth of Rome and afford those banquets and gladiatorial shows which constituted the chief occupations of the Roman citizens at that date. The Roman Empire gave way before the steady pressure of the Germanic tribes on the north and east. Their withdrawal from Britain was inevitable, and equally inevitable was the Saxon conquest. The Celtic tribes of Western Europe were everywhere dominated by this new wave of migration. The Romans came to subdue and exhort tribute, the Saxons to settle and found a new home place. The Danish invasion was merely the organised expeditions of sea rovers, their settlement in the north and east an unforeseen incident.

The result of the Norman Conquest was to make England an appanage of the throne of France, and to commence that ill-feeling which only of recent years has commenced to decline. As long as the Norman kings possessed large estates in France, England was regarded as of little importance, and it was not till the middle of the thirteenth century that the English king and baronage became proud of their name as Englishmen. The student must bear in mind that not only England but the whole of Europe during the "Dark Ages" was passing through epochs of continual change. The problems which confronted English politicians had to be faced elsewhere, and the changes here were less violent than many of those abroad. The map of Europe was continually changing, and care must be taken not to picture the Continent then as it is now. The great empire founded in 800 by Charlemagne, who received the imperial crown from the Pope, embraced a large part of Germany, France, and Spain. The lands were held by vassals, who ruled districts large enough to be considered kingdoms. The descendants of Charlemagne were unable to hold these vassals in check, and the Carlovingian Empire fell to pieces, and the honours of rule were fought for by the most powerful families. In 962 Otto the Great was crowned Emperor of the German States, and in 987 Hugh Capet founded the Capet dynasty in France. But it must not be thought that France and Germany became immediately settled states. In France it was not till Philip Augustus (1180–1223) that the titular king became king *de facto*, and even after this the powerful vassals became sometimes well-nigh independent. It was internal dissensions which favoured the English in the Hundred Years' War. The alliance of the Duke of Burgundy enabled them to hold the greater part of the country, and the loss of this alliance led to their expulsion. In Germany it was the same. The dukes, margraves, and barons were for many years waging continual warfare against each other, and from this confusion various states emerged, as Bavaria, Saxony, Hanover, etc. Throughout the Middle Ages there was an "Emperor," elected by the "Imperial Diet," a meeting of representatives from the various states. For some centuries the honour was held by the House of Hapsburg, whose family estates formed what is now Austria. Over other states the Emperor had little or no power, and hence we often find the Emperor on one side in a contest, and, say, the King of Saxony or Elector of Bavaria on the other. It was not till 1870 that Germany became one state. So in Italy, with the downfall of the Roman Empire, a number of states more or less independent sprang up. The Pope secured the temporal power over the central portion, known as the Papal States. Naples, Florence, Savoy, Sardinia, Sicily were practically independent states, though nominally under the power of Spain or France or Germany. The internecine contests crippled all advance, and it was only after Italy became united under a king in the middle of last century that Italy could be called a nation. Russia also consisted of numerous states (it was only in Tudor times that Russia or Muscovy became known) till the eighteenth century. The fall of the Eastern Empire by the taking of Byzantium in 1453 was the commencement of the Turkish Empire in Europe. In Spain the northern part consisted of Christian states, the south was in the hands of the Moors.

During the fourteenth and fifteenth centuries France became unified, the Scandinavian kingdoms were combined, and by the conquest of Granada (1497) the foundation of the powerful Spanish Empire was laid.

The sixteenth century witnessed many changes. The Reformation affected the whole of Western Europe. The Germanic peoples of the north, on the whole, became Protestant; the Latin races of the south remained Catholic. Disastrous wars were waged in Germany over this question. The discovery of the New World raised Spain to the foremost place amongst the nations, and a series of marriages and inheritances made Charles the Fifth ruler of Spain, Italy, the Netherlands, Germany, and the New World. His son, Philip the Second, though losing the German States, was the most powerful ruler in Europe, and it was against his power that diplomacy in the reign of Elizabeth was directed. The revolt of the Netherlands (leading to the foundation of the Dutch republic) was fomented and assisted by England. Continual conflicts took place on the Spanish Main, the struggle culminating in the defeat of the Armada.

During the seventeenth century Spain sank into the position of a second-rate power, the internal life of the people being paralysed by the Inquisition. France, under Richelieu, Mazarin, and Louis the Fourteenth, gradually rose to a supreme position, and extended her frontiers to the north and east. Louis the Fourteenth, "*le grand monarque*," was a man of great ability. He supported the Stuarts in their unjust rule, and was the chief object against which confederations and alliances of neighbouring states were formed. The approaching death of Charles the Second, and the fact that the nearest lineal descendant was the grandson of Louis, led to the formation of the grand alliance of England, Holland, and Austria against him, and caused the War of the Spanish Succession, in which Marlborough destroyed the prestige of the French armies, and the Treaty of Utrecht finally limited his power.

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The eighteenth century was full of events, chiefly centring round three disturbing forces :—

(1.) The rivalry of France and England for maritime and colonial supremacy.

(2.) The growth of Russia.

(3.) The rise in power of Prussia.

(1.) With regard to the first, the result of the Seven Years' War, as we have seen, was to deprive France of Canada and of political ascendency in India ; and although an attempt at retaliation was made during the war with the American colonies, the splendid victory of Rodney rendered it futile.

(2.) Russia at the beginning of the century was engaged with Sweden in a contest for supremacy in the Baltic. The defeat of Charles the Twelfth at Pultawa enabled Peter the Great to extend his dominions to the Baltic and found St. Petersburg ; and under Catherine (1762-96) the rule of Russia was extended southward to the Black Sea.

(3.) Under Frederick the Great, Prussia became the second most powerful of the German states. His action in seizing Silesia from Maria Theresa led to the War of the Austrian Succession, terminated by the Treaty of Aix-la-Chapelle, and also to British opposition to France on the Continent during the Seven Years' War.

The end of the century saw the French Revolution, and the amazing career of Napoleon, who, but for England, would have become supreme master of Europe.

Nineteenth Century.—The chief landmarks during last century are as follows :—

(1.) *France.*—Louis the Eighteenth was king till 1824, Charles from 1824-30, when a revolution occurred, and Louis Philippe became king till 1848, in which year a republic was formed, with Louis Napoleon as president. In 1852, by a *coup d'état*, he made himself emperor. He invaded Italy in 1859, nominally on behalf of Italian freedom. The ill-advised war with Prussia in 1870 led to his deposition and exile. Since then France has been a republic.

(2.) *Germany.*—In 1815 a confederation of states was formed, with Austria as the chief power. This lasted fifty years, when Prussia picked a quarrel with Austria, and won a complete victory in the Six Weeks' War. A new federation was formed, with Prussia as dominant partner, Austria being excluded. The enthusiasm raised by German successes in the Franco-German War (1870) led to the formation of the German Empire (1871), with the King of Prussia as German Emperor.

(3.) *Italy.*—The growing feeling in favour of a united Italy led to a series of contests, in which Victor Emmanuel, Cavour, and Garibaldi expelled the foreign rulers from the soil, and a united kingdom under the House of Savoy (1861) was formed, and nine years later the temporal power was taken from the Pope, and Rome became the capital.

(4.) *Belgium*, which had been united with Holland in 1815, rebelled against Dutch rule in 1830, and became a separate state, with a king of its own.

(5.) *Turkey.*—A gradual dismemberment of the Turkish Empire has been in progress since 1815 Greece, encouraged by Russia and Western sentiment, rose in rebellion in 1829, and became an independent kingdom. The battle of Navarino was fought during this contest. Russia, anxious to secure ports on the Mediterranean, has been held in check by England and other states, not from sympathy with Turkey, but from fear of Russia. The Crimean War was one instance, and the Congress of Berlin another. As a result of the latter meeting (*a*) Bosnia and Herzegovina were handed over to the administration of Austria ; (*b*) Servia and Roumania became kingdoms ; (*c*) Bulgaria was practically set free ; (*d*) Cyprus was given to England ; (*e*) part of Epirus to Greece ; and (*f*) the independence of Montenegro was recognised.

3. *Geography.*—Revise generally. Prepare sketch-maps of important countries and chief river basins, and utilise them freely in your answers. A few strokes of the pen will sometimes indicate clearly more than a dozen lines of writing. Productions and their interchange between countries should be well known. The following questions have recently been set :—

(1.) Explain and give instances in proof of the following statements :—

(*a*) Every mountain has a wet and a dry side.

(*b*) The higher you go the colder you feel.

(*c*) There are at least three great types of mankind.

(*d*) A loch is not always a lake.

(2.) Earthquake action sometimes raises land, and the denuding action of water lowers it. Give two well-known instances of each.

(3.) What is the cause of storms ? How do they usually travel in Western Europe ? How can we foretell their arrival and probable intensity ? What is an anticyclone ?

(4.) Show how the tide travels round England with respect to rate and direction. Give the maximum rise at four chief ports, and state why it is greater at some than at others. What is a bore ?

(5.) Why is it possible to have mountains permanently covered with snow in the tropics ? How are glaciers, geysers, and coral reefs formed ?

(6.) In what countries, on what rivers, and why noted are the following places—Antwerp, Rouen, Cologne, Berne, Danzig, Altona, Florence, Oporto ?

(7.) What parts of the United Kingdom are specially noted for producing salt, lead, slate, glass, earthenware, linen, paper, and leather goods ?

(8.) Give examples of commercial products which are exported only from certain districts, and explain the reason for such limitation.

(9.) What parts of Africa produce coal, coffee, grapes, ivory, rubber, salt, and wheat ? Give reasons.

(10.) Where and what are the following—Corno, Yeddo, Como, Erie, Shire, Sumatra, Aconcagua, Froward, Kangaroo, Marquesas, Andorra, Passaro, Utah, Kenia, Cuzco, Mossel, Kiu Siu, Angola, Malabar ?

4. *Elementary Science.*—Revise generally, and work the following :—

(1.) The mean diameter of a brass cylinder is 3·18 cm., its mean length 6·18 cm., its weight 413 gr. Find its volume and density. Ans. Volume, 48·96 c.c. ; density, 8·43.

(2.) A piece of round wire is 30 cm. long, its weight in air 24·227 grams and in water 21·121 grams. Find its diameter. Ans. 3·63.

(3.) A glass rod, which weighs 35 grams in air, weighs 21 in water. What will be its apparent weight in alcohol of specific gravity 0·9 ? Ans. 22·4 grams.

(4.) Show by a diagram drawn to scale the lines along which three forces of 13, 12, and 5 units must act if they are in equilibrium, and find from the diagram the angle between each pair of forces.

(5.) Draw an equilateral triangle ABC. A body moves from B to A with a velocity of 20 feet a second. Find the velocity that must be impressed upon it at A to make it move from A to C without a velocity of 20 feet a second.

Ans. 20 feet per second in direction parallel to BC.

(6.) Of two gas flames, one gives out 25 times as much light as the other. If the smaller flame be at a distance of 2 feet from the screen, what is the distance of the larger flame when the intensity of light is equal on both sides ?

(7.) Two plane mirrors are inclined toward each other. Draw and explain a diagram showing how the image of an object placed between them may be seen after three reflections.

(8.) Five hundred grams of metal are heated to 99·5 C., and placed in 450 grams of water at 15° C. The temperature rises to 23·5° C. Find the specific heat of the metal. Ans. ·1007.

(9.) What is meant by saying that the magnetic dip at London is 67° 30′ ?

(10.) An insulated conductor A is brought near to the cap of a gold leaf electroscope which has been charged positively. State and explain what will happen (*a*) if A is unelectrified, (*b*) if it is charged positively, (*c*) if it is charged negatively.

In answering questions at the examination there are a few rules which must be carefully observed :—

(1.) Make quite sure that you understand the directions given at the head of the paper.

(2.) Divide your time amongst the questions so as to be able to give a fair answer to each.

(3.) Answer clearly and to the point. You will not deceive the examiner by wandering round a question and putting down empty generalities.

(4.) Answer those questions which are easy first, and leave any requiring much thought till later.

(5.) Always allow time to revise your answers carefully.

THE PRACTICAL TEACHER,

April 1907.

In this Number will be commenced a series of readable articles on the Work of Students taking the Preliminary Certificate in 1908.

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Test Questions on Last Month's Work.

Theory of Teaching.

1. In learning the multiplication tables, which parts present the greatest difficulty to children? Account for the difficulties, and say how you would help the children to surmount them.

2. How would you teach children to divide by such a number as 36, using factors? Be particularly careful to explain the method of finding the true remainder.

English Literature.

1. Show by further quotation, or by giving the context, that you are familiar with the poems from which the following are quoted:—

(*a*) Come live with me and be my love.
(*b*) Thy tooth is not so keen
Because thou art not seen.
(*c*) Full fathom five thy father lies.
(*d*) He stakes his quiver, bow, and arrows,
His mother's doves, and team of sparrows.

2. Explain the following words and phrases:—*adamantine chains, darkness visible, empyreal, prone, under the lea;* and, if you can, quote the passages in which they occur.

English History.

1. Describe Cromwell's foreign policy, and say to what extent you consider that it was successful.

2. Give a short account of the naval history of England under the Commonwealth, *or* a life of Admiral Blake.

Geography.

1. Describe the chief rivers of France, point out how far they are navigable, give the positions of the chief towns on them, and mention the productions of their basins.

2. Compare the climate of the different parts of France, explaining, if you can, any of the peculiarities.

Arithmetic.

1. A man invests £10,000 at par, and after paying income tax on the interest, finds that he receives 3¼ per cent. on his capital; but when the income-tax is reduced by 4d. in the £, he receives $3\frac{5}{8}$ per cent. on his capital. What was the rate of interest on the stock, and how much in the £ was the income-tax?

2. A quarter of my money gains 3 per cent., a third 3½ per cent., and the rest 4 per cent.; if the annual income was £64, 10s., what was the capital invested?

Algebra.

Solve the following equations:—

(i) $3(x + 3)^2 - 5(x + 5)^2 = 7(x + 14) - 2x^2$.
(ii) $x^3 + 1 = (x + 1)(x^2 - 4x + 7) + 3x^2$.
(iii) $4(x - 2p) - 5(x - 3q) = 2(x - 7p + 3q)$.

Geometry.

The external dimensions of a box are 4 feet 3 inches, by 3 feet 2 inches, by 1 foot 11 inches. It is made of wood one inch thick, of which a cubic foot weighs 48 lbs. Find the weight of the box.

Elementary Science.

1. Explain clearly what you mean by a chemical element. Mention six compounds which can be easily resolved into their constituent elements, and say what those elements are.

2. In what respects do the metals differ from the non-metals? Mention non-metals that possess some of the characteristics of metals, and show that the metals themselves possess the distinguishing characteristics in widely different degrees.

Notes and Syllabus for March.

English Composition.

Write essays on the following subjects, which were set in the Certificate Examination, 1904:—

1. The arguments for and against making attendance at evening continuation schools compulsory by law for scholars who have left the elementary day schools.

2. The reasons by which you would be guided in your choice of a daily newspaper.

3. The improvements effected in agriculture during the last thirty years by scientific inventions.

Theory of Teaching.

Finish the section of the twelfth chapter of the text-book that deals with arithmetic—that is, to page 282.

One subject mentioned in the syllabus is now receiving a great deal of attention, but no space is given to it in the text-book—namely, school gardening.

The continued migration of the population from the country to the town is regarded as a serious social problem, and as Parliament is not prepared to render the country more habitable by reforming the land laws, teachers are urged to do what they can to stimulate a liking for country life in their children. A school garden, then, may serve one or both of two purposes. It may be employed to grow plants of different kinds, which shall be examined by the children either in the classroom or while still growing in the garden, or the garden may be regarded as the place in which instruction may be given in the art of gardening. In order to provide objects for the nature-study lesson the garden need not be very large—a few flower-pots may be used; but the larger the supply, the more effective the teaching may be made.

In order to provide a good succession of material for the nature-study lessons, a border about three feet wide should be selected in a sunny situation. This should be carefully dug two spades deep, and some well-rotted manure worked into the soil.

The question what to grow can be answered by considering what it is desired to teach, and the most important subjects are the forms and uses of the different parts of the plant.

The root is the first part to consider. The uses of the root are (*a*) to keep the plant in its position, and (*b*) to absorb soluble mineral matter for the use of the plant. As the whole of a marine plant is immersed in sea-water, which contains mineral matter in solution, it can absorb this matter through any part of its surface, and the only function of the root is to hold the plant in place. A very useful object to illustrate this is one of those pieces of seaweed attached to a stone that may be picked at any seaside place; the long, broad, ribbon-like weed (*Laminaria*) is about the best. This should be kept in the museum to supplement the plants grown in the garden. The fact that roots absorb water and mineral matter only, while the organic substances are formed in the leaves and other parts of the plant, may be shown by growing plants from seeds in water having the necessary salts dissolved in it, and by experiments on leaves, to be afterwards described. A third office served by the roots of some plants is the storage of nourishment. To show this, one or two carrots, turnips, or parsnips should be grown, and in the beginning of the winter, after they have been dug up, washed, weighed, and a careful record made, they should be replanted, and the next year after the seeds have ripened the roots should be again dug up, when it will be seen that during the first year nourishment was being accumulated in the root, and this supply was used up in the second year in promoting the growth of stem, flowers, and seeds.

The carrot affords a good example of a *tap-root*—that is, one which is a continuation of the axis or stem. Very frequently the root consists of a number of fibres given off from the end, or from some other point, of the stem. One or two grass plants should be allowed to grow to illustrate these *adventitious* roots, as they are called. The growth of these roots may be shown on strawberry runners and on ivy stems.

If there is a tree, such as an apple or elm, growing near, the ground at some distance from the trunk should be searched for roots. Children will find that the roots extend underground quite as far as the branches extend in the air, and they must be taught to connect this fact with the fact that the leaves slope outwards, and tend to throw off the rain at a distance from the stem, just where the root ends go to fetch it. A sunflower or other plant, in which the leaves are similarly disposed, should be grown, if a tree is not available, to show the tendency of the roots to spread; while a few basket ferns or hart's tongues, in which the leaves bring the rain down to the middle of the plant, should also be grown, to show that in their case the roots do not spread.

The garden should furnish specimens of the different kinds of stems. If there is no room for a tree, a bush should be grown. The fresh stem or branch of a tree will serve for lessons on medulla, wood, cambium, and bark; while a section of a mature tree should be used to show the difference between heartwood

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Mr. Geo. Chetwynd, Royal Cambrian Institution, Swansea. 2/10/05.
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and sapwood. This section should be kept in the museum with the seaweed. Plants should be grown to illustrate the difference between the woody stems of perennials, chrysanthemums, and the herbaceous stems of annuals—for example, nasturtiums, mignonette, and begonias. In order to show the various habits of growth of stems, a vegetable marrow may be grown if there is room enough. This also shows the male and female elements growing in different flowers. Most prostrate stems have a tendency to send out adventitious roots after they have grown a little. We can show this by growing a few violets, or even clover or couch grass. Stems should be shown which are unable to support themselves—for example, the scarlet runner, which twists from right to left; and the hop, which twists from left to right. Others climb by means of tendrils—for example, *peas*. Others are assisted by thorns. A branch of bramble should be kept in the museum to show how spines, by the backward direction in which they point, enable the stem to struggle upwards.

A few onions, or a hyacinth or two, should be grown in order to explain the nature of the shortened stem called a *corm*. A few crocuses should also be grown to illustrate corms which are not surrounded by fleshy leaves. (See the article on "Crocus Corms" in last month's *Practical Teacher*.) The mint plant shows the growth of undoubted underground stems, which closely resemble the erect stem. For the sake of comparison a few lilies of the valley should be grown to illustrate the accumulation of nourishment at the nodes to enable the new buds to develop in the spring. These in turn should be compared with the underground parts of the potato plant, in which the internodes of the underground stems are so thin that they might be mistaken for roots; but the thickened part, spotted with leaf-buds or eyes, and containing an accumulation of nourishment, forms the *tuber*, with which we are so familiar on the dinner table.

If there happens to be a horse-chestnut tree near at hand, its buds should be utilised in the spring in giving a lesson on leaf-buds. Some plants might be grown expressly for this lesson—for example, some Brussels sprouts; while a few briars or apple trees might be grown to show how a leaf-bud may be taken from one plant and be made to grow on another.

There is no limit to the number of plants that can be grown to illustrate forms of leaves. The lilies of the valley, recommended above, afford examples of *parallel veined* leaves; while roses, cabbages, etc., have *reticulated* leaves, the rose leaf being compound, the lily leaf and cabbage leaf being simple.

The field opened up by the study of flowers is even more extensive than that offered by the study of leaves. The object of the teacher, however, is not to train botanists, but to encourage nature study. It is not advisable, therefore, to aim at illustrating all those differences in flowers on which plants are classified, but to supply some simple flowers which children can examine to find the parts. The homely wallflower is as suitable for this purpose as any flower, and is easily grown. It should be sown a year in advance, and not allowed to flower the same year as it is sown. If specimens are required the same year, some ten-week stock should be sown. The plants will probably come up partly single and partly double. The single flowers will serve for lessons on the parts of a flower, while the double ones illustrate the modification of stamens and pistils into petals, which occurs in most double flowers. The school garden should contain as many flowers as possible, grown on account of their beauty. The children should be encouraged to observe their forms and colours, to draw them, and to describe them.

Finally, some plants should be grown to illustrate the production of seeds and fruits. Peas and beans are very useful for this purpose, as the seeds are large. A few scarlet runners are easily grown.

English Literature.

For general reading take the second book of the *Golden Treasury*. As this deals with the lyrical poetry of the age of Milton, it is specially suitable for study at the same time as *Paradise Lost*. Students should be prepared to answer such questions as, "Name the authors of any four of the following extracts, and show by further quotation or by reference to the context that you are acquainted with the poems from which they are taken." Then follow seven or eight quotations from standard poems. The candidates might be asked to say "who were the chief lyrical poets of the seventeenth century," and to show by quotations or by an account of the subject matter that they are acquainted with the principal lyrics of one or two of them.

As Milton's great epic is set for detailed study, the student should also take special interest in the poems by Milton which are given in the *Golden Treasury*. Of these the *Hymn on the Nativity* is fittingly placed at the opening of the second book, for it marks a great development in English lyrical poetry. Although there are many short and beautiful poems in the first book which have, no doubt, struck the reader's attention, there is nothing so elevated as this poem. We would call special attention to the poetic beauty of the stanzas beginning, "No war or battle's sound;" "But peaceful was the night;" "Ring out, ye crystal spheres;" and from "The oracles were dumb" to the end, although much of the beauty of the last group of stanzas is lost on those who are not familiar with the allusions. The other important poems by Milton which are given here are *Lycidas*, an elegy on the death of a friend of Milton's who was drowned on the passage to Ireland (this poem received a fair amount of censure from Dr. Johnson, but there is much poetic beauty in it), *L'Allegro*, and *Il Penseroso*. It is perhaps straining the term somewhat to describe these as *lyrical* poems, because they were not intended to be sung; but the student will find a delightful union between the words and the spirit of each poem. The former represents the cheerful man, and the latter the thoughtful man.

Prepare in detail Milton's *Paradise Lost*, Book I., lines 221–521.

226. *Incumbent*, lying on; here used literally. The word is now used in a figurative sense, as when we say that a duty is incumbent on a person.

232. *Pelorus*, a cape in Sicily, now known as Cape Faro.

239. *Stygian flood*—that is, the river Styx, or river of Hate, which is said to flow nine times round the infernal regions. In Book II. Milton calls it the "abhorred Styx, the flood of burning hate."

246. *Sovran*. It is a pity that this spelling has become changed to "sovereign," which suggests a connection with "reign," which the word has not. It is derived from *superanus*, a chief.

261. *Secure*, free from anxiety or worry. From Latin *se*, apart; and *cura*, care.

288. *Tuscan artist*—that is, Galileo. Though not the first inventor of the telescope, he made one of the earliest forms of it, on the principle of the modern opera or field glasses, and examined the moon.

289. *Fesole*, a small town on high ground just to the north of Florence.

290. *Valdarno*, or Val d'Arno, the valley of the Arno, the river on which Florence is situated.

294. *Ammiral*. In the modern word *admiral* the letter *d* is intruded. The original word is Arabic, *amir* or *emir*, a governor. In this passage ammiral is used for the flagship by metonymy.

296. *Marle*, earth or soil, generally used for one containing a fair proportion of chalk.

302. *Strow* = strew.

303. *Vallombrosa*, a shady and secluded valley not far from Florence. There was a large monastery there, but it was suppressed in 1869, and most of the buildings are used as a school of forestry.

305. *Orion*, one of the constellations supposed to bring stormy weather. "Assurgens fluctu nimbosus Orion."—Virgil, *Æneid* i. 539.

307. *Busiris*. This is the name given by Milton to the Pharaoh who was drowned in the Red Sea. See Exodus.

339. *Amram's son*—that is, Moses.

351. *A multitude*. The simile is drawn from the invasions of the hordes of Goths, Teutons, Vandals, and Huns from the north of Europe from the second to the fifth century A.D. The Vandals actually got as far as Africa—the "Libyan sands."

376. At this point Milton breaks off in the narrative to allow the heavenly Muse, in response to his request, to give a description of Satan's chief supporters.

392. *Moloch*, "the abomination of the children of Ammon." He is sufficiently described in the text.

412. *Peor*—that is, Baalpeor. When the Midianites found they were unable to induce Balaam to curse Israel, they set to work to make them incur Divine wrath by tempting them to sin.

444. *Uxorious king*—that is, Solomon; Latin *uxor* = a wife: hence Solomon is described as that uxorious king on account of the number of wives he had. See 1 Kings xi. 3. In the fifth verse of the same chapter we read that "he went after Ashtoreth, the goddess of the Zidonians."

455. *Ezekiel saw*. See Ezekiel viii. 14.

460. *Grunsel-edge* = the threshold; another form of groundsill.

464. *Azotus*, known under the earlier name of Ashdod.

467. *Rimmon*. See 2 Kings v.

484. *The rebel king*—that is, Jeroboam. See 1 Kings xii. 25–33.

506. *Prime*—that is, chief; Latin *primus* = first. Notice that Milton gives higher rank among the enemies of God to the Old Testament idols than to the gods of the Greeks and Romans. Notice the genealogy of the latter.

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English History.

Take the reigns of Charles the Second and James the Second. Little difficulty will be experienced in reading up these reigns from the text-book. There are, of course, many problems that the student can work out—for example, Why did people put up with such a king as Charles the Second? Well, this was probably in most cases because people were anxious to avoid another civil war. Besides this, many were pleased with the reaction that had set in against the austerities of the Commonwealth period. And then Charles had a remarkable way of laying the blame on to other people. There were so many conflicting interests that no statesman could possibly be popular with everybody, and hence it was an easy matter for Charles to turn the scale and come off scot free by sacrificing a minister who had given offence in other matters.

The history of this period cannot be properly understood without some knowledge of the history of Europe. This was the period of French ascendency. The reign of Louis the Fourteenth—the "Grand Monarch," as he was sometimes called—extended from 1643 to 1715. The minister who directed the affairs of France at the beginning of the reign was Cardinal Richelieu. He increased the king's power by depriving the Huguenots of the privileges granted them by Henry the Fourth, and by destroying the fortified castles of the nobles. His successor, Cardinal Mazarin, pursued the same policy, and by skilful interference in the Thirty Years' War he secured a considerable extension of French territory and influence. Louis was supported by most able generals and diplomats. He maintained the theory of the Divine right of kings, and held such absolute power that he is reported to have said, "L'Etat c'est moi"—that is, "*I* am the State." In France there had been no Magna Charta, and the Parliament was merely an advisory body. It had no power over the finances: the king could raise money without asking for authority or permission; and, in fact, when Louis the Fourteenth took over the government, the States-General had not even met for forty-seven years. In the early part of the reign a great financier, Colbert, came to the king's aid, and put the finance on a sound footing.

The claim was made that France should extend to her "natural boundaries," and before the death of Richelieu France had gained Alsace and reached to the Pyrenees. Louis then laid claim to the Spanish Netherlands through his wife; and by assuming that his kingdom of France was the same as the old empire of the Franks, he made out that the people of the Netherlands were his subjects. Louis placed himself at the head of the army, which had been remodelled, and undertook what he called a "journey," as though he were only visiting another part of his own kingdom. He easily captured about a dozen towns, and occupied Franche-Comté, which belonged to Spain, but which was detached from the rest of her dominions. Holland and the other European states were alarmed, and the Triple Alliance was formed by Holland, England, and Sweden. But Louis concluded with Spain the peace of Aix-la-Chapelle (1668), by which he agreed to return Franche-Comté, but to retain the towns he had taken. The opposition shown by the Dutch filled him with enmity towards them, and he induced Charles the Second to leave the Triple Alliance and conclude the Treaty of Dover, by which he agreed to help France against the Dutch.

In 1672 Louis crossed the Rhine with 100,000 men, and soon overcame the opposition offered by south Holland. But when he advanced farther north, William of Orange induced the people to open the sluices and flood the country. This compelled the French to retire to the south parts of the country. On this the Elector of Brandenburg entered into alliance with the Dutch, and the Emperor sent an army to help them. England also deserted Louis, and made peace with the Dutch. After six years' fighting a peace was made at Nimeguen (1678), by which it was agreed that France should retain Franche-Comté, but that Holland should remain intact.

The student will now be able to understand the nature of the struggle between Louis the Fourteenth and William the Third, which we shall take up next month.

Geography.

Study in detail the geography of the German Empire. Students should try to increase their knowledge of geography in every possible way. Even from an examination standpoint wide reading will be found to pay, not only because the student who has read widely can illustrate his answers by the intelligent addition of appropriate details, but also because questions are often set for the purpose of finding out whether the candidate knows anything of geography that is not set down between the covers of his text-book. A short time ago the following was set: "Explain and illustrate the meaning of five of the following expressions—Buffer State, Hinterland, Neutral Zone, Sphere of Influence, Treaty Port, The Open Door, Most Favoured Nation, The Roof of the World." We will now endeavour to indicate their meanings briefly.

Buffer State.—The buffers are the plates that project beyond the end of a railway carriage, and are attached to springs in such a way as to mitigate the violence of the shock when two carriages strike together. Hence a small state that lies between the possessions of two powerful states, and prevents those states from coming into collision, is called a buffer state. As an example we might mention Siam, which serves as a buffer between the British possessions of Burmah and the French possessions of Cambodia and Tonkin.

Hinterland.—We have already explained the meaning of the term in connection with a seaport. It is the country lying behind the port, and which receives imports through, and exports its produce from, that port. It has, however, another meaning; for if a country has settlements along the coast in a part of the world not belonging to another power, it claims a sort of influence over the land behind its settlements. The term is a German word, and was much employed at the time of what is known as the "scramble for Africa," when those countries that had settlements on the coast laid a sort of claim to the land behind them. This right was admitted, and the whole district over which it extended was called the "Sphere of Influence," which consequently is not a colony, but the district which a power might later on decide to colonise, and from which the other powers agreed to abstain from interfering with

Neutral Zone, a strip of land between the possessions of two countries which belongs to neither. For example, between the fortress of Gibraltar and Spanish territory there is a neutral zone.

Treaty Port, a port which is thrown open in accordance with a treaty, as Amoy and Tientsin in China.

The Open Door.—Nations which do not accept the principle of free trade endeavour to secure the exclusive trade of the lands under their influence by imposing such high duties on their rivals that competition becomes impossible. Thus when the French took possession of Madagascar they effectively destroyed English trade. Now that nations contend in the peaceful rivalry of commerce, very little objection is raised to the establishment of political supremacy over a district provided that trade is left free to all comers. This is generally spoken of as the policy of the "Open Door." Japan has promised to accept this policy in Corea.

Most Favoured Nation.—Countries which have not adopted free trade endeavour to keep out the goods of other countries by imposing heavy duties on the produce sent by the latter. These in turn retaliate by imposing duties on the goods of the former. Generally speaking, each country endeavours to impose such duties on goods coming from other countries as it thinks will balance the duties imposed by them on the goods they import from it. As Great Britain does not impose any duties with the object of keeping out the goods sent from any other country whatever, we might expect that every other country should admit British produce duty free. This, however, is not the case, and in negotiating treaties of commerce we generally have to be content with what is known as the *most favoured nation clause*, which is a proviso that although the country with whom we are negotiating will not admit any foreign produce free of duty, yet it will let in British goods on the same terms as goods from the most favoured nation with which it deals.

The Roof of the World, the name given to the great table-land in Central Asia. It is the largest plateau in the world.

Arithmetic.

Master chap. xlv., and work the examples.

Algebra.

Finish the examples on simple equations, and work the problems at the end of chap. xviii., after reading carefully through the chapter.

Geometry.

Study the geometry of the following (including the determination of their volume and the area of faces or surfaces):—tetrahedron, sphere, cylinder, wedge, pyramid, and cone.

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FOR THE HISTORY LESSON.

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A Short History of Great Britain. Many teachers know and like Mr. Warner's *Brief Survey of British History*. This is the basis of the work now under consideration. The text has been slightly altered, so as to suit the requirements of Standard VII., but the excellent arrangement of the chapters has been retained. Illustrations have been added, and also a well-written short course of lessons on civics. The result is highly satisfactory—a first-rate book for a middle form or Standard VII.

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Round the Empire. By George R. Parkin, C.M.G., LL.D. This book has been thoroughly revised and brought up to date. New illustrations have been added, including photographs of the recently opened bridge across the Victoria Falls and of Rhodes's grave in the Matoppos, and the book is to be commended from every point of view. The aim of the writer is to develop the imperial instinct to the exclusion of Jingoism, and Lord Rosebery contributes a preface, written in 1892, amply supporting this desirable endeavour. Boys and girls in elementary schools will gain a large amount of useful knowledge from this well-arranged book, and should become better citizens because of it.

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Britain Long Ago. It seems a pity that our country's legends should be studied only from a philological point of view. They are as interesting as those of Greece and Rome, which are accessible in translations. We trust that the excellent versions of the old stories here given will tend to popularise them, for of a hundred persons who are familiar with the names of Guy of Warwick and Bevis of Hampton hardly one could write three lines about their adventures. We heartily commend these modernised versions of our early English literary works as a reading book for the upper standards or for secondary schools.

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Longman's Historical Series for Schools. Book III. An Advanced History of Great Britain. By T. F. Tout, M.A. Professor Tout is to be heartily congratulated on his performance. Teachers who have seen Books I. and II. will have high expectations regarding Book III., and they will not be disappointed, for this volume combines all the best features of a good text-book. It is well supplied with excellent maps and plans, some of which are usually found only in large works, and the genealogies are numerous and full. The author's name is a guarantee of scholarship. Three points that particularly please us are the treatment of Welsh history, the chapters dealing with social and constitutional matters, and the prominence justly given at certain times to foreign affairs. At the end of each part is a useful bibliography. The publishers have done their work well: the book is well bound and cheap.

Outlines of British History for Catholic Schools. By E. Wyatt-Davies, M.A. We must confess that in our opinion the title of this book is unfortunate, as being likely to give rise to misconception. And yet some such title was unavoidable, for the writer intends his work to be used in the junior forms of Catholic secondary schools, and therefore, so far as is possible, has emphasised the importance of religious influences. It is a sound and accurate piece of work. The illustrations, many of which are portraits, are decidedly good, and the last chapter, on colonial history, also merits special praise. The book deserves a wide circulation among the class for which it is intended.

Selections from the writings of J. A. Froude and **Selections from the writings of Lord Macaulay.** Like the other volumes in the "Silver Library" these two books combine interest and instruction. The selections from Froude consist of three sections—Historical Scenes, Historical Portraits, and Historical Sketches. We think it will be difficult to find a more acceptable prize book for the elder boys. Such exciting events so graphically recorded form the kind of reading boys delight in. Some of it, too, is sad. Our young readers will lose much of their admiration for "Good Queen Bess" on reading the account of the treatment of the sailors who fought so gloriously against the Armada.

The name of Macaulay is in itself a sufficient guarantee for the second book. We can only say that the extracts have been selected with great care.

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Tales of the Middle Ages.—The literature of the Middle Ages contains a vast amount of matter of prime interest to children, but it is little known except to those who study it for the sake of the language in which it is clothed. The present volume contains some of the Arthurian legends and such romantic stories as *Havelok the Dane* and *King Horn*, pruned down to convenient length and written in first-class modern English prose.

Mediæval History. By M. A. Howard, B.A. This is Part II. of "A Primer of General History," and treats of European history during the long period of the Middle Ages topically. The chapters have been carefully planned and well written, and most of them—for example, those on Feudalism and on the Monks and Friars—are exceedingly interesting. One or two, on account of the subject matter, contain many names, but that is unavoidable. There are good sketch maps. The issue of such books is a welcome sign that the study of history is not confined to the story of this land.

A First History of England. Part VI., 1689–1820. By C. Linklater Thomson. Many teachers will agree with the author that it is not advisable to try to study this period with very young children. Holding this view, the writer intends this book for children of the age of fourteen, and it is therefore more detailed and less simple in style than its title might suggest. It is well suited to the needs of its intended readers, the style being clear and the treatment ample without any overloading of details. Religious, social, and industrial movements receive due attention.

Illustrative History: Stuart Period. By J. W. B. Adams, M.A. As a supplementary book this will be found exceedingly useful. It consists of extracts from many writers, mostly contemporary, and is intended to lead boys "to take a real and active interest in the work,"—a purpose it will undoubtedly accomplish. The selection has been made from a great variety of sources, and with much wisdom. We should be glad to see books of this type used largely, as adjuncts to text-books.

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A School History of Warwickshire. By Bertram C. A. Windle, F.R.S., F.S.A. Of the many books which have been written of this historical county this is a kind of abstract. It contains, as the author is compelled to acknowledge in his preface, collected fragments from "a host of books." These fragments are, however, put together in such a way as only one who is thoroughly familiar with the country could put them; but as to making a *School History* of them for class reading, we think the author has failed. It is interesting and well published, and will be, we have no doubt, widely requisitioned for library purposes. The illustrations are good, and have been particularly well chosen.

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THE NORMAL PRESS, LTD., 47 MELFORD ROAD, EAST DULWICH, LONDON, S.E.

The Normal History of England. By A. F. Dodd. 3s. 6d. net. Considerable praise may be awarded to this new book, of a class which is already very large. The treatment of the subject is generally marked by power and insight, though there is some inequality, as, for example, in the treatment of Wales and of Scotland under Edward I., the latter being much the better. The style is, on the whole, easy and flowing. Summaries, questions, and a historical chart increase the value of a satisfactory work.

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Old Testament History. By George Carter, M.A., Headmaster of New College School, Oxford. The text used in this book is that of the Revised Version, by special permission of the Universities of Oxford and Cambridge. The period dealt with runs from the descent of Jacob into Egypt to the election of Saul. The text, which occupies 136 pages, is printed in good clear type. The notes and admirable biographical sketches cover nearly 70 pages, and there is a full index. The book is very well done.

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Introduction to Algebra. By R. C. Bridgett, M.A., B.Sc., F.C.S., Assistant Master in Rothesay Academy. This is no ordinary introduction to Algebra, but a book which ought to be worked through by every pupil before going farther in the study of what is commonly considered to be Algebra. The author's aim is to show the relations which exist between Arithmetic, Algebra, and Geometry, and to firmly root in the mind of the pupil the idea that in one of its aspects Algebra is a generalised form of Arithmetic, and in another a mode of expression of truths which Geometry makes vivid to the eye. There is an abundant series of good exercises in the higher rules of Arithmetic and the simpler cases of Mensuration, using symbols instead of definite quantities. The pupil who works through this book will receive a valuable training in expressing quantities in general terms. The lack of such a preliminary training as this often makes the first steps in Algebra very wearisome and difficult.

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Plane Geometry, Practical and Theoretical. By J. S. Mackay, M.A., LL.D., F.R.S.E. Books IV. and V., corresponding to Euclid's Elements, V. and VI., with appendices. This is a book of Geometry on modern lines, rejecting Euclid's verbiage and cumbrousness, while retaining all that is essential in his demonstrations. The principles laid down by Euclid are carried forward in the treatment of transversals, harmonic division, similitude and inversion, pole and polar, and loci. Many well-known theorems of ancient and modern geometricians are introduced, and there is an abundance of well-chosen exercises. We should have liked to see a few illustrations of methods of determining loci worked out, as this is a subject that most pupils find great difficulty with. The book is a very good one, and should find its way into many schools.

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Graphs of Algebraical Functions of the First and Second Degrees. By W. Mudie, F.E.I.S., late Headmaster of Clepington Public School, Dundee; Author of *Factors in Algebra*. This is a good introduction to the study of graphs. Somewhat too much has been crowded into a small space, and the correlation of Geometry and Algebra is therefore not given the prominent position it should have in a book on this subject. The explanations are, however, clear, and the illustrations, though mostly drawn on far too small a scale, abundant.

Elementary Arithmetical Graphs. By W. Mudie. This book seeks to introduce the study of graphs to pupils who go no farther in mathematics than arithmetic; and we think the object a good one, and the subject is here well treated. There seems, however, little to be gained by treating compound proportion in this way. The graphs are merely repetitions of graphs connected with simple proportion, and does not represent to the eye the joint variation of the quantities.

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Continuous Mental Arithmetic.—This book shows much originality of treatment, and the lines on which it is drawn up are thoroughly sound, and should be very effective. The examples in each exercise centre round one cardinal point, and thus not only is time saved in setting the sums, but the teaching is more connected and logical.

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A Method of Teaching Chemistry in Schools. By A. M. Hughes, B.Sc., and R. Stern, B.Sc. Here is another book dealing with the heuristic method of teaching chemistry in schools. It is evidently intended as a guide to the teacher rather than the students. It will, however, only be of use to such teachers as are in favour of the heuristic method. Following the course given in the book, the children are supposed to classify substances which they bring from home into substances which char when heated and those which do not, or into organic or inorganic substances. They are then expected, without any previous instruction in the methods of manipulating chemical apparatus, to be able to perform such experiments as the distillation of water with a distilling flask and Liebig's condenser.

Any experienced teacher, if he gave beginners such an apparatus to fit up, would expect to have half the apparatus broken, and probably he would not be disappointed. Quite early in the course, too, the pupils are expected to prepare concentrated sulphuric acid from ferrous sulphate. One can hardly expect beginners to progress so quickly, especially when taught on the heuristic method.

This, in fact, is the chief fault to be found with the book. The students are hurried on too quickly, and expected to perform experiments which they cannot understand.

Moreover, although quantitative work is undertaken in the course, the authors forbid the use of chemical equations, which is certainly a great mistake. Some of the diagrams must appear quite absurd to the practical chemist. On page 99, for example, we have a picture of a metal tube being heated with the burner close to the corks which fill the ends of the tube. The tubes and flasks are shown without sufficient supports, and the whole diagram seems to indicate lack of practical experience on the part of the authors. On page 28 is a picture of a retort being used for distillation. A retort supported as this is represented to be would certainly break on being heated, owing to expansion.

THE CLARENDON PRESS, OXFORD.

The Preliminary Geography. By Dr. A. J. Herbertson. This is the first volume, though the second in time of publication, of the series of Oxford geographies, and the success achieved by its predecessor is deserved also by the present book. In some ways it is rather an advance upon the former, as in its simpler style. The book is largely descriptive; it gives definite word-pictures of different parts of the world in a manner which makes for the teaching of realities rather than mere names. The different phenomena—for example, particular types of climate or volcanoes—are described and explained in connection with some good example which is encountered in the imaginary journeys across the continents. The book is arranged, largely in the form of such journeys, in such a way as to include typical scenes and features, and important rivers and cities; but it is far from the dreary categories of dry facts, more or less useless, into which these travels frequently degenerate. With nearly one hundred and fifty pages, it has about seventy maps, which illustrate special features, such as the natural vegetation or the rainfall of a region—maps which usefully supplement those in the ordinary atlas. It is unnecessary to say of a book by Dr. Herbertson that it is accurate. Certainly, to work through this book would be to give a good grounding for further study in geography.

LONGMANS, GREEN, AND CO., LONDON.

Practical Physical Chemistry. By Alexander Findlay, M.A., Ph.D., D.Sc., Lecturer on Physical Chemistry, Birmingham University. This book has been written primarily for the students of the Birmingham University who are taking the author's course in physical chemistry; but its sale will certainly not be confined to Birmingham, as it supplies a want that has been felt for some time. The study of physical chemistry is slowly but steadily being extended. The number of technical institutions is always increasing, and it is becoming more and more admitted that a course on chemistry is not complete unless it embraces a course on practical physical chemistry. Up to the present time the needs of English students for a text-book on the laboratory processes connected with the proper study of elementary physical chemistry have scarcely been catered for at all. Hence the welcome with which this book will be received by many teachers and students. The experiments dealt with have been well selected, and, on the whole, very well described. A few useful tables have been included, but it is a pity more tables of the physical properties of substances likely to be used in a course on practical physical chemistry have not been included, especially as these are now practically ready to the author's hand as the result of the work of Kohlrausch, Ostwald, and others. The diagrams are numerous and clear, and will be much appreciated by students when fitting up the apparatus for the various experiments. All advanced students should possess a copy of this book, and teachers will also find in it many useful hints which have been included as the results of the practical experience of the author.

School Hygiene and the Laws of Health. By Charles Potter. This volume aims at instructing teachers in the principles of physiology and the laws of health in such a way as to enable them to supervise the health of the children in so far as it comes under their charge in the school. The treatment is very full and thorough; in fact, the first part might almost be used as a text-book of physiology. The second part deals with school buildings, and so concerns architects and authorities who are responsible for the provision of the school premises rather than the teachers who have to use them. But even here there is much for the teacher to learn, for he should be thoroughly familiar with the systems of drainage and ventilation installed in his school.

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Shelley's Adonais, and **Macaulay's Life of Goldsmith.** These two works are published with short notes in the Carmelite Classics, and both will prove welcome to many secondary schools. The prose biography is interesting to every one, and the beautiful elegy should teach the senior pupils to recognise and appreciate true poetic feeling in verse.

The Temple Infant Readers, Nos. 1, 2, and 3. These Infant Readers follow the orthodox lines in their general arrangement. The type used is sufficiently large, but unpleasant in its contrasts of thick and thin lines, which mars the appearance of the page, and is not conducive to clearness of form. We do not like the illustrations, which apparently aim at boldness and simplicity, but are rarely attractive, to put it as mildly as possible.

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The Health of the School Child. By W. Leslie Mackenzie. Dr. Mackenzie has favoured us with his account of a subject on which he is extremely well qualified to speak, and which is now receiving much attention from the general public. Fear has been expressed in some quarters that teachers will resent the entrance of the doctor into the schools; but if the medical examination of school children is carried out on the lines recommended by Dr. Mackenzie, we are sure that all teachers will welcome the doctor's visit. An important section of the book deals with the manner in which medical inspection is carried on in German schools, and, on the whole, the regulations in force there seem applicable to English schools. We must, of course, bear in mind that the passive obedience found among German parents is not so common here. Passive resistance seems more the order of the day, and we may find "conscientious objections" to re-vaccination on leaving school, as well as other obstacles which are not allowed to stand in the way of German officials. We cordially commend this valuable book to our readers.

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